

Superfund Records Center

SITE: Industri Plex

BREAK: 3.3

OTHER: 25267

Fall Baseflow



TRILLIUM INC.
Consultants in Environmental Chemistry

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May 18, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2264A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 2/Surface Waters/SW-04, SW-09
1/Field Blank
Selected Total Metals: 2/Surface Waters/SW-01, SW-10
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 4/Surface Waters/SW-01, SW-10, SW-04, SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 4/Surface Waters/SW-01, SW-10, SW-04, SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

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- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - * • Preservation and Technical Holding Times.
 - Instrument Calibration.
 - * • Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - * • Inductively Coupled Plasma (ICP) Interference Check Samples.
 - Matrix Spike (MS).
 - * • Laboratory Duplicates.
 - * • Field Duplicates.
 - * • Laboratory Control Sample.
 - * • ICP Serial Dilution Analysis.
 - * • Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis

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includes unacceptable matrix spike recoveries for lead and selenium, negative calibration blank responses, and laboratory blank contamination. There was one major impact on data usability.

- Results for aluminum in both samples were qualified as less than the reported values based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

- The result for copper in SW-09 was qualified as less than the reported value based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 10/6/00, via facsimile on 5/17/01. This document confirmed that all samples were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

Calibration

An unacceptably high recovery for nickel was reported in CCV3 (202.6%; QC 90-110%). This CCV was not directly associated with the reported analyses of SW-04 or SW-09, therefore no qualifiers were applied on this basis.

Blanks

The following analytes were detected in associated blanks:

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Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Calibration	20.7 µg/L	103.5 µg/L	U
Barium	Field	0.90 µg/L	4.5 µg/L	None
Calcium	Field	265 µg/L	1325 µg/L	None
Copper	Field	3.7 µg/L	18.5 µg/L	U
Iron	Field	32.6 µg/L	163 µg/L	None
Magnesium	Field	42.1 µg/L	210.5 µg/L	None
Manganese	Field	3.7 µg/L	18.5 µg/L	None
Potassium	Calibration	487 µg/L	2435 µg/L	None
Sodium	Field	258 µg/L	1290 µg/L	None
Zinc	Preparation	13.4 µg/L	67.0 µg/L	None

Barium, calcium, iron, magnesium, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination. The result for copper in SW-04 was also present at a concentration exceeding the action limit and was therefore not qualified based on blank contamination.

Results for aluminum in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

The result for copper in SW-09 was qualified as less than the reported value (U) based on blank contamination.

In a calibration blank, thallium gave a response that was greater than two times the negative instrument detection limit (IDL). Since this negative response may indicate the possibility of false negatives, results for thallium in SW-04 and SW-09 were qualified as estimated (UJ).

Matrix Spike

The following analytes did not meet recovery criteria for surface water sample SW-09:

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Analyte	%REC	Limits	Action
Lead	60.8	75-125%	J, UJ
Selenium	65.1	75-125%	UJ

Results for lead and selenium in SW-04 and SW-09 were qualified as indicated above.

Sample Quantitation

Results for chromium in both samples and for cobalt and nickel in SW-04 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/ekd

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

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TABLE I

INDUSTRI-PLEX SITE

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Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ¹ , J ^{1,2,3,4}	A	A
SW-09	AQ	A ^{1,2} , J ^{1,2,3}	A	A

AQ - aqueous

NA - not applicable

A = Accept the results for the sample.

A¹ = Accept the results for the sample, but qualify the positive results for aluminum as not detected (U) due to blank contamination.

A² = Accept the results for the sample, but qualify the positive result for copper as not detected (U) due to blank contamination.

J¹ = Estimate (UJ) the result for thallium due to a negative calibration blank response.

J² = Estimate (J, UJ) the results for lead and selenium due to unacceptable matrix spike recoveries.

J³ = Estimate (J) the result for chromium because it is less than twice the applicable instrument detection limit.

J⁴ = Estimate (J) the results for cobalt and nickel because they are less than twice the applicable instrument detection limits.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2264A
Overall Evaluation of Data**

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <p>1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site.</p> <p>2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events.</p> <p>3. Be representative of the actual site conditions and comparable to other data generated in support of this project.</p>	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J^{1,2,3,4}</p>	<p>Refer to qualifications in Table I</p> <p>A²</p>		<p>1. Results for aluminum in both samples were qualified as less than the reported values due to blank contamination.</p> <p>2. The result for copper in SW-09 was qualified as less than the reported value due to blank contamination.</p> <p>3. Results for lead and selenium in both samples were estimated due to unacceptable matrix spike recoveries.</p> <p>4. Results for chromium in both samples and for cobalt and nickel in SW-04 were estimated because they were less than 2xIDL.</p> <p>5. Results for thallium in both samples were estimated due to negative calibration blank responses.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
INORGANIC DATA VALIDATION**

- J =** The associated value is an estimated quantity.
- R =** The data are unusable. (Note: Analyte may or may not be present).
- U =** The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ =** The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

(

DATA SUMMARY FORM: TOTAL TAL METALS
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2264A

CRDL	Sample Number	Lab ID	Date Sampled	SW-04		SW-09											
				002264A-03		002264A-04											
				05-Oct-00		05-Oct-00											
200	Aluminum			37.3	U	50.7	U										
60	Antimony			5.0	U	5.0	U										
10	Arsenic			13.1		12.6											
200	Barium			27.1		26.0											
5	Beryllium			0.50	U	0.50	U										
5	Cadmium			1.2		0.50	U										
5000	Calcium			41800		42600											
10	Chromium			1.3	J	2.2	J										
50	Cobalt			1.2	J	1.0	U										
25	Copper			23.1		7.9	U										
100	Iron			996		1540											
3	Lead			2.0	UJ	3.3	J										
5000	Magnesium			6280		6580											
15	Manganese			310		383											
0.2	Mercury			0.10	U	0.10	U										
40	Nickel			2.4	J	1.5	U										
5000	Potassium			8150		8010											
5	Selenium			5.0	UJ	5.0	UJ										
10	Silver			1.0	U	1.0	U										
5000	Sodium			42700		44300											
10	Thallium			6.0	UJ	6.0	UJ										
50	Vanadium			1.0	U	1.0	U										
20	Zinc			231		160											

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2264A

Sample Number Lab ID Date Sampled		SW-04		SW-09													
		002264A-03		002264A-04													
		05-Oct-00		05-Oct-00													
CRDL																	
10	Arsenic	2.5	U	12.3													

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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS
WATER SAMPLES
(mg/L)

Site Name: Industri-Plex

STL Report No. 7000-2264A

Sample Number Lab ID Date Sampled CRDL		SW-09		SW-09													
		002264A-03		002264-04													
		05-Oct-00		05-Oct-00													
5.0	TSS	5.0	U	5.0	U												

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REGION I
Data Review Worksheets

Site Name Industri-Plex
Reference Number _____

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

Trillium, Inc.
The hardcopied (laboratory name) STL Connecticut data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No. 7000-2264A SAS No. _____ Sampling Date(s) 10/5/00
SDG. No. _____ Matrix AQ Shipping Date(s) 10/5/00
No. of Samples 5 Date Rec'd by Lab 10/6/00

Traffic Report Nos: SW-01, SW-10, SW-04, SW-09

Trip Blank No.: _____
Equipment Blank No.: Field Blank
Field Dup Nos: SW-01/SW-10

EPA-4010B/7470A
~~SOW No. 1100.2~~ requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- | | |
|---------------------------------|------------------------------|
| -Data Completeness | -Field Duplicates |
| -Holding Times | -Lab Control Sample Results |
| -Calibrations | -Furnace AA Results |
| -Blanks | -ICP Serial Dilution Results |
| -ICP Interference Check Results | -Detection Limit Results |
| -Matrix Spike Recoveries | -Sample Quantitation |
| -Laboratory Duplicates | |

Overall Comments: Tier II validation - SW-04 and SW-09 only

Definitions and Qualifiers:

- A - Acceptable data.
- J - Approximate data due to quality control criteria.
- R - Reject data due to quality control criteria.
- U - Analyte not detected.

Reviewer: CAE/KSR Date: 5/17/01
CAE 5/18/01

I. DATA COMPLETENESS

DATE REC'D

sample pHs	5/16/01	5/17/01
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REGION I .
Data Review Worksheets

II. HOLDING TIMES

Complete table for all samples and circle the analysis date for samples not within criteria.

[illegible]

METALS - 180 DAYS FROM SAMPLE COLLECTION
MERCURY - 28 DAYS FROM SAMPLE COLLECTION
CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

REGION I
Data Review worksheets

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

DATE	ICV/CCV#	ANALYTE	%R	ACTION	SAMPLES AFFECTED
10/24/00	CCV3	Ni	202.6	None	CCV3 does not bracket either validated spl
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTIONS:

If any analyte does not meet the %R criteria follow the actions stated below:

For Positive Results:

	Accept	Estimate (J)	Reject (R)
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

For Non-detected Results:

	Accept	Estimate (UJ)	Reject (R)
Metals	90-125%R	75-89%R	<75%R, >125%R
Mercury	80-135%R	65-79%R	<65%R, >135%R
Cyanide	85-130%R	70-84%R	<70%R, >130%R

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCBI	PREP BL	ANALYTE	CONC./UNITS
10/24/00	ICB	—	Fe	— 14.1 µg/L
	ICB	—	K	362.0 µg/L
	CCBI	—	Al	20.7 µg/L
	↓	—	Mg	12.9 µg/L
		—	K	296.8 µg/L
	CCBI	—	TL	— 7.6 µg/L

no action

(cont. next pg)

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
10/5/00	Field Blank	Al	13.8 µg/L
		Ba	0.90 µg/L
		Ca	245 µg/L
		Cu	3.7 µg/L
		Fe	32.6 µg/L
		Mg	42.1 µg/L
		Mn	3.7 µg/L
		K	313 µg/L

Na 258 µg/L

Zn 9.9 µg/L

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
<u>10/24/00</u>	<u>CCB2</u>	<u>—</u>	<u>Al</u>	<u>10.8 µg/L</u>
	<u>"</u>		<u>K</u>	<u>302.8 µg/L</u>
	<u>CCB3</u>	<u>—</u>	<u>15.1 Al</u>	<u>15.1 µg/L</u>
	<u>↓</u>		<u>K</u>	<u>487.2 µg/L</u>
			<u>Na</u>	<u>34.0 µg/L</u>

(cont. next pg)

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
10/24/00	# —	PBW	Al	16.23 µg/L
↓	—	↓	K	279.88 µg/L
↓	—	↓	Zn	13.48 µg/L
10/24/00	CCB4	—	Al	19.8 µg/L
↓	↓	—	Mg	11.7 µg/L
↓	↓	—	K	224.5 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

VI. MATRIX SPIKE

TR # SW-09

MATRIX: AQ

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spikes sample result
SR - sample result

Analyte	SSR	SR	S	%R	Action
Pb	15.46	3.31	20	60.8	J, UJ
Se	6.51	5.04	10	65.1	UJ

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

- If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- If any analyte does not meet the %R criteria follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>74%
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	A

2. Frequency Criteria

- Was a matrix spike prepared at the required frequency? Yes or No
- Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery?
Pb 84.5% Se 105.8% Yes or No

A separate worksheet should be used for each matrix spike pair.



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May 14, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2264A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 4/Surface Waters/SW-01, SW-10, SW-04, SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- * • Initial and Continuing Calibration.

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- Blanks.
 - Surrogate Compounds.
 - * • Internal Standards.
 - Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
 - * • Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
 - NA • PE Samples/Accuracy Check.
 - NA • Target Compound Identification.
 - NA • Sample Quantitation and Reported Quantitation Limits.
 - NA • SVOC and Pesticides Cleanup.
 - NA • System Performance.
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes method blank contamination and poor LFB performance. There were two major impacts on data usability:

- The result for pentachlorophenol in SW-04 was rejected because this compound was not recovered in the laboratory fortified blank analysis.
- Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits due to contamination in the associated method blank.

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STL Connecticut Report #7000-2264A

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compound was reported in the associated method blank:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Method	1 µg/L	10 µg/L	U

Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) based on the associated method blank contamination.

Surrogates

An unacceptably high recovery (126%; QC 35-114%) was reported for nitrobenzene-d₅ in SW-04 (126%). Since only one surrogate recovery was unacceptable in this analysis, no qualifiers were warranted.

Matrix Spike/Matrix Spike Duplicate

Unacceptably high recoveries were reported for 1,2,4-trichlorobenzene (107% and 102%; QC 39-98%) in both spiked analyses and for pentachlorophenol (109%; QC 9-103%) in the MS. No action was warranted on this basis.

Laboratory Fortified Blank

Recovery of 2,4-dinitrophenol (58%) was unacceptably low (QC 70-139%) in the laboratory fortified blank analysis. Results for 2,4-dinitrophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, acceptable recovery was not demonstrated for benzoic acid in the laboratory fortified

Mr. Larry McTiernan

14 May 2001

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STL Connecticut Report #7000-2264A

blank analysis associated with these samples, based on the validator's professional judgment (22%). Results for benzoic acid in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Pentachlorophenol (at 40 µg/L) was not recovered (0%) in the laboratory fortified blank (QC 63-125%). However, SW-09 was also prepared and analyzed as a matrix spike/matrix spike duplicate pair. The MS/MSD spiking solution includes pentachlorophenol (at 100 µg/L), and very good recoveries (109% and 100%) were obtained for this compound in the spiked analyses of SW-09. Therefore, based on professional judgment, the result for pentachlorophenol in SW-04 was rejected (R) as unreliable due to the lack of recovery in the laboratory fortified blank. The result for pentachlorophenol in SW-09 was qualified as estimated (UJ), rather than being rejected, based on the acceptable recoveries of pentachlorophenol in the spiked analyses of this sample, which mitigate the lack of recovery for this analyte in the laboratory fortified blank.

The laboratory, however, should investigate the poor laboratory fortified blank recoveries and implement appropriate corrective action. Poor recoveries in a blank spike analysis are indicative of a potentially serious problem in the analytical process.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/psn

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

C:\AllTrillium\Roux SedTransport\2264SV

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2264A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	A ¹ , J ¹ , R ¹
SW-09	AQ	A ¹ , J ^{1,2}

AQ - aqueous

A¹ = Accept the results for the sample, but qualify the result for bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL based on method blank contamination.

J¹ = Estimate (J, UJ) the results for 2,4-dinitrophenol and benzoic acid due to poor recoveries in the laboratory fortified blank.

J² = Estimate (UJ) the result for pentachlorophenol due to no recovery in the laboratory fortified blank but acceptable recoveries in the matrix spikes using this sample.

R¹ = Reject (R) the result for pentachlorophenol due to no recovery in the laboratory fortified blank.

TABLE II
INDUSTRI-PLEX SITE
STL REPORT #7000-2264A
Overall Evaluation of Data

Semivolatile Organic Compounds (SVOCs)					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J^{1,2} R¹</p>	<p>None</p>		<ol style="list-style-type: none"> 1. Lack of recovery of pentachlorophenol in the laboratory fortified blank analysis renders results for this compound unusable in SW-04. Acceptable MS/MSD recoveries for this compound led to qualification of the result for pentachlorophenol in SW-09 as estimated, rather than rejected. 2. Results for 2,4-dinitrophenol and benzoic acid in both samples were estimated due to poor laboratory fortified blank recoveries. 3. Results for bis(2-ethylhexyl)phthalate in both samples were qualified as less than the sample-specific CRQLs due to method blank contamination.

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J =** The associated numerical value is an estimated quantity.
- R =** The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U =** The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ =** The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS I
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2264A

CRQL**	Sample Number	SW-04	SW-09						
	Lab ID	002264A-03	002264A-04						
	Dilution Factor*	1.18	1.39						
	Date Sampled	05-Oct-00	05-Oct-00						
	Date Extracted	09-Oct-00	09-Oct-00						
	Date Analyzed	11-Oct-00	11-Oct-00						
10	Cyclohexanone								
10	Phenol								
10	bis(2-Chloroethyl)ether								
10	2-Chlorophenol								
10	1,3-Dichlorobenzene								
10	1,4-Dichlorobenzene								
10	Benzyl alcohol								
10	1,2-Dichlorobenzene								
10	2-Methylphenol								
10	bis(2-chloroisopropyl)ether								
10	4-Methylphenol								
10	N-Nitroso-di-n-propylamine								
10	Hexachloroethane								
10	Nitrobenzene								
10	Isophorone								
10	2-Nitrophenol								
10	2,4-Dimethylphenol								
50	Benzoic acid	69 J	UJ						
10	bis(2-Chloroethoxy)methane								
10	2,4-Dichlorophenol								
10	1,2,4-Trichlorobenzene								
10	Naphthalene								

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\2264SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

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DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2264A

Sample Number		SW-04	SW-09						
Lab ID		002264A-03	002264A-04						
Dilution Factor*		1.18	1.39						
Date Sampled		05-Oct-00	05-Oct-00						
Date Extracted		09-Oct-00	09-Oct-00						
Date Analyzed		11-Oct-00	11-Oct-00						
CRQL**									
10	4-Chloroaniline								
10	Hexachlorobutadiene								
10	4-Chloro-3-methylphenol								
10	2-Methylnaphthalene								
10	Hexachlorocyclopentadiene								
10	2,4,6-Trichlorophenol								
50	2,4,5-Trichlorophenol								
10	2-Chloronaphthalene								
50	2-Nitroaniline								
10	Dimethylphthalate								
10	Acenaphthylene								
10	2,6-Dinitrotoluene								
50	3-Nitroaniline								
10	Acenaphthene								
50	2,4-Dinitrophenol	UJ	UJ						
50	4-Nitrophenol								
10	Dibenzofuran								
10	2,4-Dinitrotoluene								
10	Diethylphthalate								
10	4-Chlorophenyl-phenylether								
10	Fluorene								
50	4-Nitroaniline								

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\2264SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2264A

Sample Number		SW-04	SW-09						
Lab ID		002264A-03	002264A-04						
Dilution Factor*		1.18	1.39						
Date Sampled		05-Oct-00	05-Oct-00						
Date Extracted		09-Oct-00	09-Oct-00						
Date Analyzed		11-Oct-00	11-Oct-00						
CRQL**									
50	4,6-Dinitro-2-methylphenol								
10	N-Nitrosodiphenylamine								
10	4-Bromophenyl-phenylether								
10	Hexachlorobenzene								
50	Pentachlorophenol	R	UJ						
10	Phenanthrene								
10	Anthracene								
10	Di-n-butylphthalate								
10	Fluoranthene								
10	Pyrene								
10	Butylbenzylphthalate								
20	3,3'-Dichlorobenzidine								
10	Benzo(a)anthracene								
10	Chrysene								
10	bis(2-Ethylhexyl)phthalate	12 U	14 U						
10	Di-n-octylphthalate								
10	Benzo(b)fluoranthene								
10	Benzo(k)fluoranthene								
10	Benzo(a)pyrene								
10	Indeno(1,2,3-cd)pyrene								
10	Dibenz(a,h)anthracene								
10	Benzo(g,h,i)perylene								

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

Roux SedTransport\2264SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name STL Connecticut SOW/Method No. EDA 8270C
Case/Project No. _____ Sampling Date(s) 10/5/00
SDG No. 7000-2264A Shipping Date(s) 10/5/00
No. of Samples/Matrix 5/AQ Date Rec'd by lab 10/6/00

Traffic Report Sample Nos. SW-01, SW-10, SW-04, SW-09

Trip Blank No. _____
Equipment Blank No. Field Blank
Bottle Blank No. _____
Field Duplicate Nos. SW-01 / SW-10
PES Nos. _____

The Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation

SW-04 and SW-09 only

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

- A - Acceptable Data
- J - Numerical value associated with compound is an estimated quantity.
- R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
- U - Compound not detected at that numerical sample quantitation limit.
- UJ - The sample quantitation limit is an estimated quantity.
- TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carola Erikson Company Name Trillium Inc Phone Number 8659668880

Date Validation Started 5/12/01

Date Validation Completed 5/14/01

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	✓
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	✓
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	✓
VOA/SV-III	INITIAL CALIBRATION	✓
VOA/SV-IV	CONTINUING CALIBRATION	✓
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NA
SV-VI	SV SURROGATE SPIKE RECOVERIES	
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	✓
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	✓
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NA
VOA/SV-XV	SEMIVOLATILE CLEANUP	NA
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: Carol A. Erikson

Name: Carol A. Erikson

Date: 5/14/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Sampler: Chris Milone Company: Roux Assoc, Inc.

Contacted: Yes ☒ No ☐ Date: _____

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
10/9/00	10/11/00	SV	SALR12 / method	HP5971Q	B2EHP	1 µg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)

Validator: CA Erikson

Date: 5/2/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-B

3. Blank Actions - List the maximum concentrations of blank compounds.

[illegible]

Comments: _____

Validator: CA Erikson

Date: 5/2/01

EPA-NE - Data Validation Worksheet
SV-VI

VI. SV SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

Method	Base/Neutral Method QC Acceptance Criteria					
	NBZ-d ₅	2-FBP	TPH-d ₁₄	1,2-DCB-d ₄ *	Other:	
OLM03.2	Water Soil 35-114 23-120	Water Soil 43-116 30-115	Water Soil 33-141 18-137	Water Soil 16-110 20-130		
OLC02.1	40-110	30-110	20-140	NA		
Other:						
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	% Recovery	Action
SW-04/AQ	126 70					None

Method	Acid Method QC Acceptance Criteria					
	Phenol-d ₄	2-FP	2,4,6-TBP	2-CP-d ₄ *	Other:	
OLM03.2	Water Soil 10-110 24-113	Water Soil 21-110 25-121	Water Soil 10-123 19-122	Water Soil 33-110 20-130		
OLC02.1	15-115	15-110	15-130	NA		
Other:						
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	% Recovery	Action

* Advisory Surrogates - OLM03.2

Validator: CA Gnikson

Date: 5/4/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-VIII

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE - List all MS/MSD analytes that are outside method QC acceptance criteria.

Use a separate worksheet for each MS/MSD pair.

Sample # SW-09

Matrix AQ

Concentration Level Low

Parameter	Compound	MS %Rec	MSD %Rec	RPD	Method QC Limits		Concentration			% RSD	Action
					% Rec	RPD	Unspiked Sample	MS	MSD		
SV	1,2,4 trichlorobenzene	107%	102		39-98						None
SV	pentachlorophenol	109			9-103						None

Validator: CR Erikson

Date: 5/12/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? Y N
- Does it contain all target compounds at the method-required QLs? Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AQ	benzoic acid	22% (QC 0-25%)			J, WJ
AQ	2,4 dinitrophenol	58 (70-139%)			WJ
AQ	pentachlorophenol	0 (63-125%)			R-SW04
					WJ-SW09

Validator: Carol Erikson

Date: 5/12/01

Fall Storm 1



TRILLIUM INC.

Consultants in Environmental Chemistry

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May 18, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2279A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 2/Surface Waters/SW-04, SW-09
1/Field Blank
Selected Total Metals: 8/Surface Waters/SW-01, SW-10, SW-02, SW-03,
SW-05, SW-06, SW-07, SW-08
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 10/Surface Waters/SW-01, SW-10, SW-02, SW-03, SW-
04, SW-05, SW-06, SW-07, SW-08, SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 10/Surface Waters/SW-01, SW-10, SW-02, SW-03,
SW-04, SW-05, SW-06, SW-07, SW-08, SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-

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specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - * • Preservation and Technical Holding Times.
 - * • Instrument Calibration.
 - * • Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - Inductively Coupled Plasma (ICP) Interference Check Samples.
 - * • Matrix Spike (MS).
 - * • Laboratory Duplicates.
 - * • Field Duplicates.
 - * • Laboratory Control Sample.
 - * • ICP Serial Dilution Analysis.
 - * • Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

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Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes unacceptable recoveries for lead in the interference check sample and laboratory blank contamination. There was one major impact on data usability.

- Results for aluminum in both samples were qualified as less than the reported values based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. The following major impacts on data usability were noted:

- Results for calcium, copper, and magnesium in both samples were qualified as less than the reported values based on field blank contamination.
- The result for barium in SW-09 was qualified as less than the reported value based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 10/11/00, via facsimile on 5/17/01. This document confirmed that all samples were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

Blanks

The following analytes were detected in associated blanks.

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Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Calibration	23.1 µg/L	115.5 µg/L	U
Antimony	Calibration	5.3 µg/L	26.5 µg/L	None
Barium	Field	5.6 µg/L	28.0 µg/L	U
Calcium	Field	14,500 µg/L	72,500 µg/L	U
Copper	Field	1.4 µg/L	7.0 µg/L	U
Iron	Field	84.4 µg/L	422 µg/L	None
Magnesium	Field	1650 µg/L	8250 µg/L	U
Manganese	Field	8.5 µg/L	42.5 µg/L	None
Potassium	Field	369 µg/L	1845 µg/L	None
Sodium	Field	1220 µg/L	6100 µg/L	None
Thallium	Calibration	6.5 µg/L	32.5 µg/L	None
Zinc	Field	7.9 µg/L	39.5 µg/L	None

Antimony and thallium were not detected in either site sample, therefore no sample results were affected by the associated blank contamination.

Iron, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination. The result for barium in SW-04 was also present at a concentration exceeding the action limit and was therefore not qualified based on blank contamination.

Results for aluminum, calcium, copper, and magnesium in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

The result for barium in SW-09 was qualified as less than the reported value (U) based on blank contamination.

ICP Interference Check Sample

Interference check sample results for lead (76.6% and 72.1%) did not meet the acceptance criterion (80-120% Recovery). Results for lead in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.



Mr. Larry McTiernan
18 May 2001
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STL Connecticut Report #7000-2279A

Sample Quantitation

The result for cadmium in SW-04 and for chromium in SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson
Quality Assessment Manager

CAE/das

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

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TABLE I
INDUSTRI-PLEX SITE
STL Connecticut Report #7000-2279A
Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ¹ , J ^{1,2}	A	A
SW-09	AQ	A ^{1,2} , J ^{1,3}	A	A

AQ - aqueous

NA - not applicable

A = Accept the results for the sample.

 A¹ = Accept the results for the sample, but qualify the positive results for aluminum, calcium, copper, and magnesium as not detected (U) due to blank contamination.

 A² = Accept the results for the sample, but qualify the positive result for barium as not detected (U) due to blank contamination.

 J¹ = Estimate (UJ) the result for lead due to unacceptable interference check sample results.

 J² = Estimate (J) the result for cadmium because it is less than twice the applicable instrument detection limit.

 J³ = Estimate (J) the result for chromium because it is less than twice the applicable instrument detection limit.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2279A
Overall Evaluation of Data**

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids				
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**
		Analytical Error	Sampling Error*	
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J^{1,2,3}</p>	<p>Refer to qualifications in Table I</p> <p>A^{1,2}</p>	<p>1. Results for aluminum calcium, copper, and magnesium in both samples were qualified as less than the reported values due to field and/or laboratory blank contamination.</p> <p>2. The result for barium in SW-09 was qualified as less than the reported value due to blank contamination.</p> <p>3. The result for lead was estimated due to unacceptable interference check sample results.</p> <p>4. Results for cadmium in SW-04 and for chromium in SW-09 were estimated because they were less than 2xIDL.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
INORGANIC DATA VALIDATION**

- J = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

(

DATA SUMMARY FORM: TOTAL TAL METALS
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2279A

CRDL	Sample Number		SW-04		SW-09											
	Lab ID		002279A-05		002279A-10											
	Date Sampled		09-Oct-00		09-Oct-00											
200	Aluminum		31.3	U	55.9	U										
60	Antimony		5.0	U	5.0	U										
10	Arsenic		10.0		9.3											
200	Barium		29.8		25.5	U										
5	Beryllium		0.50	U	0.50	U										
5	Cadmium		0.68	J	0.50	U										
5000	Calcium		42900	U	35300	U										
10	Chromium		1.0	U	1.7	J										
50	Cobalt		1.0	U	1.0	U										
25	Copper		6.1	U	6.7	U										
100	Iron		800		1140											
3	Lead		2.0	UJ	2.0	UJ										
5000	Magnesium		6330	U	5290	U										
15	Manganese		330		266											
0.2	Mercury		0.10	U	0.10	U										
40	Nickel		1.5	U	1.5	U										
5000	Potassium		7670		6500											
5	Selenium		5.0	U	5.0	U										
10	Silver		1.0	U	1.0	U										
5000	Sodium		41300		36000											
10	Thallium		6.0	U	6.0	U										
50	Vanadium		1.0	U	1.0	U										
20	Zinc		230		182											

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2279A

Sample Number Lab ID Date Sampled		SW-04		SW-09											
		002279A-05		002279A-10											
		09-Oct-00		09-Oct-00											
CRDL															
10	Arsenic	2.5	U	2.5	U										

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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS
WATER SAMPLES
(mg/L)

Site Name: Industri-Plex

STL Report No. 7000-2279A

Sample Number Lab ID Date Sampled		SW-04		SW-09											
		002279-5		002279-10											
		09-Oct-00		09-Oct-00											
CRDL															
5.0	TSS	5.0	U	5.0											

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REGION I
Data Review Worksheets

Site Name Industri-Plex
Reference Number _____

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

Trillium Inc.
The hardcopied (laboratory name) STL Connecticut data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No. 7000-2279A SAS No. _____ Sampling Date(s) 10/9/00
SDG. No. _____ Matrix AQ Shipping Date(s) 10/10/00
No. of Samples 11 Date Rec'd by Lab 10/11/00

Traffic Report Nos: SW-01, SW-10, SW-02, SW-03, SW-04, SW-05,
SW-06, SW-07, SW-08, SW-09

Trip Blank No.: _____

Equipment Blank No.: Field Blank

Field Dup Nos: SW-01/SW-10

EPA 6010B/7470A, 140.2
SOW No. _____ requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- | | |
|---------------------------------|------------------------------|
| -Data Completeness | -Field Duplicates |
| -Holding Times | -Lab Control Sample Results |
| -Calibrations | -Furnace AA Results |
| -Blanks | -ICP Serial Dilution Results |
| -ICP Interference Check Results | -Detection Limit Results |
| -Matrix Spike Recoveries | -Sample Quantitation |
| -Laboratory Duplicates | |

Overall Comments: Tier II validation - SW-04 and SW-09 only

Definitions and Qualifiers:

- A - Acceptable data.
- J - Approximate data due to quality control criteria.
- R - Reject data due to quality control criteria.
- U - Analyte not detected.

Reviewer: CAErikson Date: 5/17/01

CAE 5/18/01

REGION I
Data Review Worksheets

II. HOLDING TIMES

Complete table for all samples and circle the analysis date for samples not within criteria.

[illegible]

METALS - 180 DAYS FROM SAMPLE COLLECTION
MERCURY - 28 DAYS FROM SAMPLE COLLECTION
CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
10/25/00	CCB1	—	Al	14.1 µg/L
	CCB2	—	Mg	10.2 µg/L
	CCB2	—	Sb	5.3 µg/L
	CCB3	—	Al	10.2 µg/L
	CCB4	—	TL	6.5 µg/L
	CCB5	—	Al	12.8 µg/L
	CCB6	—	As	2.8 µg/L
		—	Al	23.1 µg/L
		—	Mg	10.1 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
10/9/00	Field Blank	Al	20.9 µg/L
		Ba	5.6 µg/L
		Ca	14500 µg/L
		Cu	1.4 µg/L
		Fe	84.4 µg/L
		Mg	1650 µg/L
		Mn	8.5 µg/L
		K	369 µg/L
		Na	1220 µg/L
		Zn	7.9 µg/L

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
<u>Al</u>	<u>23.1 µg/L</u>	<u>115.5 µg/L</u>
<u>Mg</u>	<u>1650 µg/L</u>	<u>8250 µg/L</u>
<u>Sb</u>	<u>5.3 µg/L</u>	<u>26.5 µg/L</u>
<u>Tl</u>	<u>6.5 µg/L</u>	<u>32.5 µg/L</u>
<u>Ba</u>	<u>5.6 µg/L</u>	<u>28.0 µg/L</u>
<u>Ca</u>	<u>14,500 µg/L</u>	<u>72,500 µg/L</u>
<u>Cu</u>	<u>1.4 µg/L</u>	<u>7.0 µg/L</u>

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
<u>Iron</u>	<u>84.4 µg/L</u>	<u>422 µg/L</u>
<u>Mn</u>	<u>8.5 µg/L</u>	<u>42.5 µg/L</u>
<u>K</u>	<u>369 µg/L</u>	<u>1845 µg/L</u>
<u>Na</u>	<u>1220 µg/L</u>	<u>6100 µg/L</u>
<u>Zn</u>	<u>7.9 µg/L</u>	<u>39.5 µg/L</u>
<u>As</u>	<u>-2.8 µg/L</u>	<u>(no action)</u>
_____	_____	_____

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X $\frac{\text{Volume diluted to (200ml)}}{\text{Weight digested (1gram)}}$ X $\frac{1L}{1000ml}$ X $\frac{1000gm}{1kg}$ X $\frac{1mg}{1000ug}$ = mg/kg

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I
Data Review Worksheets

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED
10/25/00	Pb	76.6	UJ	SW-04, SW-09
		72.1	UJ	

ACTIONS:

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?

Yes or No

If no,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.



TRILLIUM INC.
Consultants in Environmental Chemistry

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May 15, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2279A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 10/Surface Waters/SW-01, SW-10, SW-02, SW-03, SW-04, SW-05, SW-06, SW-07, SW-08, SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- Initial and Continuing Calibration.

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Mr. Larry McTiernan

15 May 2001

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- * • Blanks.
 - * • Surrogate Compounds.
 - * • Internal Standards.
 - * • Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
 - * • Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
 - NA • PE Samples/Accuracy Check.
 - NA • Target Compound Identification.
 - NA • Sample Quantitation and Reported Quantitation Limits.
 - NA • SVOC and Pesticides Cleanup.
 - NA • System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes calibration variability and poor LFB performance. There was one major impact on data usability:

- The result for pentachlorophenol in SW-04 was rejected because this compound was not recovered in the laboratory fortified blank analysis.

Mr. Larry McTiernan
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Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Calibration

Compounds that did not meet criteria in the continuing calibrations are summarized below:

Instrument ID:	HP5972S	Action		Affected Samples
Compound	CC 10/23/00 @12:21	Positive Detects	NDs	
benzyl alcohol	49.4 %D	NA	UJ	SW-04

Sample results will be qualified as indicated in the above table.

Laboratory Fortified Blank

Recovery of 2,4-dinitrophenol (55%) was unacceptably low (QC 70-139%) in the laboratory fortified blank analysis. Results for 2,4-dinitrophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, acceptable recovery was not demonstrated for benzoic acid in the laboratory fortified blank analysis associated with these samples, based on the validator's professional judgment (11%). Results for benzoic acid in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Pentachlorophenol (at 40 µg/L) was not recovered (0%) in the laboratory fortified blank. However, SW-09 was also prepared and analyzed as a matrix spike/matrix spike duplicate pair. The MS/MSD spiking solution includes pentachlorophenol (at 100 µg/L), and very good recoveries (83% and 77%) were obtained for this compound in the spiked analyses of SW-09. SW-09 and SW-04 were analyzed on different dates; the MS/MSD pair was run on the same date as SW-09 and the laboratory fortified blank was run in the same analysis series as SW-04. Therefore, based on professional judgment, the result for pentachlorophenol in SW-04 was rejected (R) as unreliable due to the lack of recovery in the laboratory fortified blank. The result for pentachlorophenol in SW-09 was qualified as estimated

Mr. Larry McTiernan
15 May 2001
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STL Connecticut Report #7000-2279A

(UJ), rather than being rejected, based on the acceptable recoveries of pentachlorophenol in the spiked analyses of this sample, which mitigate the lack of recovery for this analyte in the laboratory fortified blank.

The laboratory, however, should investigate the poor laboratory fortified blank recoveries and implement appropriate corrective action. Poor recoveries in a blank spike analysis are indicative of a potentially serious problem in the analytical process.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/ekd

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2279A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	J ^{1,2} , R ¹
SW-09	AQ	J ^{2,3}

AQ - aqueous

A = Accept the results for the sample.

J¹ = Estimate (UJ) result for benzyl alcohol due to a high %D in the continuing calibration.

J² = Estimate (UJ) the results for 2,4-dinitrophenol and benzoic acid due to poor recoveries in the laboratory fortified blank.

J³ = Estimate (UJ) the result for pentachlorophenol due to no recovery in the laboratory fortified blank but acceptable recoveries in the matrix spikes using this sample.

R¹ = Reject (R) result for pentachlorophenol due to no recovery in the laboratory fortified blank.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2279A
Overall Evaluation of Data**

Semivolatile Organic Compounds (SVOCs)					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <p>1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site.</p> <p>2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events.</p> <p>3. Be representative of the actual site conditions and comparable to other data generated in support of this project.</p>	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>J^{1,2,3} R¹</p>	<p>None</p>		<p>1. Lack of recovery of pentachlorophenol in the laboratory fortified blank analysis renders the result for this compound unusable in SW-04. Acceptable MS/MSD recoveries for this compound led to qualification of the result for pentachlorophenol in SW-09 as estimated, rather than rejected.</p> <p>2. The result for benzyl alcohol in SW-04 was estimated due to calibration variability.</p> <p>3. Results for 2,4-dinitrophenol and benzoic acid in both samples were estimated due to poor laboratory fortified blank recoveries.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J** = The associated numerical value is an estimated quantity.
- R** = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U** = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ** = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS I
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2279A

[illegible]

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

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** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2279A

Sample Number Lab ID Dilution Factor* Date Sampled Date Extracted Date Analyzed CRQL**	SW-04	SW-09							
	002279A-05	002279A-10							
	1.14	1.14							
	09-Oct-00	09-Oct-00							
	16-Oct-00	16-Oct-00							
	23-Oct-00	24-Oct-00							
10 4-Chloroaniline									
10 Hexachlorobutadiene									
10 4-Chloro-3-methylphenol									
10 2-Methylnaphthalene									
10 Hexachlorocyclopentadiene									
10 2,4,6-Trichlorophenol									
50 2,4,5-Trichlorophenol									
10 2-Chloronaphthalene									
50 2-Nitroaniline									
10 Dimethylphthalate									
10 Acenaphthylene									
10 2,6-Dinitrotoluene									
50 3-Nitroaniline									
10 Acenaphthene									
50 2,4-Dinitrophenol	UJ	UJ							
50 4-Nitrophenol									
10 Dibenzofuran									
10 2,4-Dinitrotoluene									
10 Diethylphthalate									
10 4-Chlorophenyl-phenylether									
10 Fluorene									
50 4-Nitroaniline									

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\2279SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2279A

[illegible]

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

Roux SedTransport\2279SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name STL Connecticut
Case/Project No. _____
SDG No. 7000-2279A
No. of Samples/Matrix 10/AG

SOW/Method No. EPA 8270C
Sampling Date(s) 10/9/00
Shipping Date(s) 10/10/00
Date Rec'd by lab 10/11/00

Traffic Report Sample Nos. SW-01, SW-10, SW-02, SW-03, SW-04, SW-05,
SW-06, SW-07, SW-08, SW-09

Trip Blank No. NA
Equipment Blank No. Field Blank
Bottle Blank No. NA
Field Duplicate Nos. SW-01 / SW-10
PES Nos. _____

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation

SW-04 and SW-09 only

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

- A - Acceptable Data
- J - Numerical value associated with compound is an estimated quantity.
- R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
- U - Compound not detected at that numerical sample quantitation limit.
- UJ - The sample quantitation limit is an estimated quantity.
- TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carola-Erikson Company Name Trillum, Inc. Phone Number 8659468880

Date Validation Started 5/11/01

Date Validation Completed 5/15/01

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	✓
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	✓
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	✓
VOA/SV-III	INITIAL CALIBRATION	✓
VOA/SV-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	✓
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	✓
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NK
SV-VI	SV SURROGATE SPIKE RECOVERIES	✓
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	✓
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	✓
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	✓
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NK
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NK
VOA/SV-XV	SEMIVOLATILE CLEANUP	NK
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: Carol A. Erikson

Name: Carol A. Erikson

Date: 5/12/01

EPA-NE - Data Validation Worksheet
VOA/SV-IV

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

[illegible]

Validator: CA Erikson

Date: 5/11/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency?
- Does it contain all target compounds at the method-required QLs? @ 40/120 µg/L
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can't tell

Y N
Y N
Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AQ	24 DNP (QC 70-139)	55%	—	SW-04, -09	UJ
AQ	PCP (QC 63-125)	0%		" "	SW-04: R
					SW-09: none (based on CAF 5/11/01 NS/MSD)
	(benzoic acid (QC 0-25))	11%		SW-04, -09	UJ ... PJ

Validator: CA GRISSON

Date: 5/11/01

Fall Storm 2



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May 18, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2381A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 2/Surface Waters/SW-04, SW-09
1/Field Blank
Selected Total Metals: 8/Surface Water/SW-01, SW-02, SW-03, SW-05,
SW-06, SW-07, SW-08, SW-10
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 10/Surface Waters/SW-01, SW-02, SW-03, SW-04, SW-
05, SW-06, SW-07, SW-08, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 10/Surface Waters/SW-01, SW-02, SW-03, SW-
04, SW-05, SW-06, SW-07, SW-08, SW-09, SW-
10
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

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Mr. Larry McTiernan
18 May 2001
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The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - * • Preservation and Technical Holding Times.
 - * • Instrument Calibration.
 - Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - * • Inductively Coupled Plasma (ICP) Interference Check Samples.
 - Matrix Spike (MS).
 - * • Laboratory Duplicates.
 - * • Field Duplicates.
 - * • Laboratory Control Sample.
 - * • ICP Serial Dilution Analysis.
 - * • Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during

Mr. Larry McTiernan
18 May 2001
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storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes unacceptable CRDL standard recoveries for thallium and lead and laboratory blank contamination. There was one major impact on data usability.

- Results for lead in both samples qualified as less than the reported values based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

- Results for aluminum, barium, calcium, chromium, copper, magnesium, and nickel in both samples were qualified as less than the reported values based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples..

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 10/23/00, via facsimile on 5/17/01. This document confirmed that all samples for metals analysis were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

CRDL Standards

The following analytes did not meet recovery criteria in the CRDL standard analyses:

Mr. Larry McTiernan

18 May 2001

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Analyte	%REC	Limits	Action
thallium	46.7, 59.7	80-120%	UJ
lead	151.5	80-120%	J

Results for thallium and lead in SW-04 and SW-09 were less than 3xCRDL and were qualified as indicated above based on the unacceptable CRDL standard recoveries.

No CRDL standard was run for mercury in association with these sample analyses.

Blanks

The following analytes were detected in associated blanks.

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Field	110 µg/L	550 µg/L	U
Antimony	Calibration	7.1 µg/L	35.5 µg/L	None
Barium	Field	7.1 µg/L	35.5 µg/L	U
Calcium	Field	35,700 µg/L	178,500 µg/L	U
Chromium	Field	2.5 µg/L	12.5 µg/L	U
Copper	Field	4.2 µg/L	21.0 µg/L	U
Iron	Field	110 µg/L	550 µg/L	None
Lead	Calibration	3.0 µg/L	15.0 µg/L	U
Magnesium	Field	4230 µg/L	21,150 µg/L	U
Manganese	Field	13.4 µg/L	67.0 µg/L	None
Nickel	Field	1.7 µg/L	8.5 µg/L	U
Potassium	Field	902 µg/L	4510 µg/L	None
Sodium	Field	2690 µg/L	13,450 µg/L	None
Zinc	Field	16.8 µg/L	84.0 µg/L	None

Mr. Larry McTiernan
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Antimony was not detected in either of the site samples; therefore, no qualifiers were necessary due to the blank contamination for this analyte.

Iron, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Results for aluminum, barium, calcium, chromium, copper, lead, magnesium, and nickel in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

Matrix Spike

The following analytes did not meet recovery criteria for surface water sample SW-09:

Analyte	%REC	Limits	Action
Selenium	125.8	75-125%	None

Selenium was not detected in either of the site samples and the spike recovery was slightly high, suggesting false positives or a high bias. Therefore, no qualifiers were applied on this basis and the "N" qualifiers applied by the laboratory were removed.

Sample Quantitation

Results for cadmium and cobalt in SW-04 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/psn

Mr. Larry McTiernan
18 May 2001
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STL Connecticut Report #7000-2381A

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

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TABLE I**INDUSTRI-PLEX SITE****STL Connecticut Report #7000-2381A****Recommendation Summary**

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ¹ , J ^{1,2}	A	A
SW-09	AQ	A ¹ , J ¹	A	A

AQ - aqueous

A = Accept the results for the sample.

A¹ = Accept the results for the sample, but qualify the positive results for aluminum, barium, calcium, chromium, copper, lead, magnesium, and nickel as not detected (U) due to blank contamination.J¹ = Estimate (UJ) the results for lead and thallium due to unacceptable CRDL standard recoveries.J² = Estimate (J) the results for cadmium and cobalt because they are less than twice the applicable instrument detection limits.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2381A
Overall Evaluation of Data**

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <p>1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site.</p> <p>2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events.</p> <p>3. Be representative of the actual site conditions and comparable to other data generated in support of this project.</p>	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J^{1,2}</p>	<p>Refer to qualifications in Table I</p> <p>A¹</p>		<p>1. Results for aluminum, barium, calcium, chromium, copper, lead, magnesium, and nickel in both samples were qualified as less than the reported values due to blank contamination.</p> <p>2. Results for lead and thallium in both samples were estimated due to unacceptable CRDL standard recoveries.</p> <p>3. Results for cadmium and cobalt in SW-04 were estimated because they were less than 2xIDL.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
INORGANIC DATA VALIDATION**

- J = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

1

STL Report No. 7000-2381A

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(ug/L)

STL Report No. 7000-2381A

[illegible]

\\Roux SedTransport\2381in2

DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS
WATER SAMPLES
(mg/L)

Site Name: Industri-Plex

STL Report No. 7000-2381A

Sample Number Lab ID Date Sampled CRDL		SW-04		SW-09									
		002381A-04		002381A-09									
		20-Oct-00		20-Oct-00									
5.0	TSS	7.5		5.0	U								

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REGION I
Data Review Worksheets

Site Name Industri-Plex
Reference Number _____

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

The Trillium, Inc.
(hardcopied (laboratory name) STL Connecticut data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No. 7000-2381A SAS No. _____ Sampling Date(s) 10/19-20/00
SDG. No. _____ Matrix AA Shipping Date(s) 10/20/00
No. of Samples 11 Date Rec'd by Lab 10/21/00

Traffic Report Nos: SW-01, SW-02, SW-03, SW-04, SW-05, SW-06,
SW-07, SW-08, SW-09, SW-10

Trip Blank No.: _____

Equipment Blank No.: Field Blank

Field Dup Nos: SW-01/SW-10

EPA 6010B/7470A,
SOW No. 160.2 requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- | | |
|---------------------------------|------------------------------|
| -Data Completeness | -Field Duplicates |
| -Holding Times | -Lab Control Sample Results |
| -Calibrations | -Furnace AA Results |
| -Blanks | -ICP Serial Dilution Results |
| -ICP Interference Check Results | -Detection Limit Results |
| -Matrix Spike Recoveries | -Sample Quantitation |
| -Laboratory Duplicates | |

Overall Comments: Tier II validation - SW-04 and SW-09 only

Definitions and Qualifiers:

- A - Acceptable data.
J - Approximate data due to quality control criteria.
R - Reject data due to quality control criteria.
U - Analyte not detected.

Reviewer: CA Erikson Date: 5/17/01
5/18/01 CAE

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION

DATE LAB CONTACTED

DATE REC'D

raw data

OK per client - no action

sample pHs

5/16/01

5/17/01

II. HOLDING TIMES

II. HOLDING TIMES

II. HOLDING TIMES

II. HOLDING TIMES

II. HOLDING TIMES

- ## II. HOLDING TIMES

REGION I
Data Review Worksheets

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

- A. Did the laboratory use the proper number of standards for calibration as described in the SOW? Yes or No
- B. Were calibrations performed at the beginning of each analysis? Yes or No
- C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent? Yes or No
- D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN ≥ 0.995 ? *not doc'd* Yes or No
- E. Was a standard at 2xCRDL analyzed for all ICP analyses? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

CRDL	Std:	Tl	46.7%	59.7%
		Pb		151.5%

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
11/6/00	ICB	—	Sb	7.1 µg/L
	CCB1	—	Ca	11.2 µg/L
	CCB3	—	Tl	-7.7 µg/L
	CCB3	—	Al	-10.8 µg/L
	CCB4	—	Al	-10.8 µg/L
	CCB4	—	Fe	-15.1 µg/L
	CCB4	—	Pb	2.0 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
10/20/00	Field Blank	Al	110 µg/L
		Ba	7.1 µg/L
		Ca	35,700 µg/L
		Cr	2.5 µg/L
		Cu	4.2 µg/L
		Fe	110 µg/L

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

all neg values $< |2 \times IDL| \Rightarrow$ no action

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
11/16/00	CCB4	—	Tl	-8.8 ug/L
	CCB5	—	Ca	12.1 ug/L
	CCB5	—	Pb	3.0 ug/L
	PBW	PBW	Ca	10.2 ug/L
	PBW	PBW	Pb	2.0 ug/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
10/20/00	Field Blank	Pb	2.9 ug/L
		Mg	4230 ug/L
		Mn	13.4 ug/L
		Ni	1.7 ug/L
		K	902 ug/L
		Na	2690 ug/L
		Zn	16.8 ug/L

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

VI. MATRIX SPIKE

TR # SW-09

MATRIX: AQ

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spikes sample result
SR - sample result

Analyte	SSR	SR	S	%R	Action
<u>Se</u>	<u>12.58</u>	<u>5.04</u>	<u>10.0</u>	<u>125.8</u>	<u>A</u> (exceeds "N")

Matrix Spike Actions apply to all samples of the same matrix.

Se post spike - 106.5%

ACTIONS:

- If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- If any analyte does not meet the %R criteria follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>125%
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	A

2. Frequency Criteria

- Was a matrix spike prepared at the required frequency? Yes or No
- Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery? Yes or No

A separate worksheet should be used for each matrix spike pair.



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May 15, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2381A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 10/Surface Waters/SW-01, SW-02, SW-03, SW-04, SW-05, SW-06, SW-07, SW-08, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- Initial and Continuing Calibration.

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Mr. Larry McTiernan
15 May 2001
Page 2

STL Connecticut Report #7000-2381A

	•	Blanks.
*	•	Surrogate Compounds.
*	•	Internal Standards.
*	•	Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
*	•	Field Duplicates.
	•	Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
NA	•	PE Samples/Accuracy Check.
NA	•	Target Compound Identification.
NA	•	Sample Quantitation and Reported Quantitation Limits.
NA	•	SVOC and Pesticides Cleanup.
NA	•	System Performance.
*	=	All criteria were met for this parameter.
NA	=	Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes calibration variability and poor LFB performance. There were two major impacts on data usability:

- The result for pentachlorophenol in SW-04 was rejected because this compound was not recovered in the laboratory fortified blank analysis.

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- Results for benzoic acid in both samples were rejected due to no recovery in the laboratory fortified blank analysis.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Calibration

Compounds that did not meet criteria in the initial and continuing calibrations are summarized in the following table.

Instrument ID:	HP5971Q	HP5971Q	Action		Affected Samples
Compound	IC 11/3/00	CC 11/2/00 @10:25	Positive Detects	NDs	
hexachlorocyclopentadiene	30.5%RSD		NA	UJ	None (MS/MSD only)
benzyl alcohol		27.7%D	NA	UJ	SW-04, SW-09
benzoic acid		28.1%D	NA	UJ	SW-04, SW-09
hexachlorocyclopentadiene		30.4%D	NA	UJ	SW-04, SW-09

Sample results will be qualified as indicated above.

Blanks

The following compound was reported in the associated method and field blanks:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Field	1 µg/L	10 µg/L	None - ND
diethylphthalate	Method	0.4 µg/L	4.0 µg/L	None - ND

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Neither target analyte found in the blanks was detected in either of the site samples. Therefore, no qualifiers were applied based on blank contamination.

Laboratory Fortified Blank

Recoveries of 2,4-dinitrophenol (35%; QC 70-139%) and 2,4,5-trichlorophenol (58%; QC 71-124%) were unacceptably low in the laboratory fortified blank analysis. Results for 2,4-dinitrophenol and 2,4,5-trichlorophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, acceptable recovery was not demonstrated for benzoic acid in the laboratory fortified blank analysis associated with these samples, based on the validator's professional judgment (0%). Results for benzoic acid in SW-04 and SW-09 were rejected (R) on this basis.

Pentachlorophenol (at 40 µg/L) was not recovered (0%) in the laboratory fortified blank (QC 63-125%). However, SW-09 was also prepared and analyzed as a matrix spike/matrix spike duplicate pair. The MS/MSD spiking solution includes pentachlorophenol (at 100 µg/L), and very good recoveries (78% and 89%) were obtained for this compound in the spiked analyses of SW-09. Therefore, based on professional judgment, the result for pentachlorophenol in SW-04 was rejected (R) as unreliable due to the lack of recovery in the laboratory fortified blank. The result for pentachlorophenol in SW-09 was qualified as estimated (UJ), rather than being rejected, based on the acceptable recoveries of pentachlorophenol in the spiked analyses of this sample, which mitigate the lack of recovery for this analyte in the laboratory fortified blank.

The laboratory narrative in this data package indicates that they are investigating the cause of the poor pentachlorophenol recovery in this quality control analysis. However, in the absence of additional information or raw data review, the qualifiers discussed above must be applied.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

Mr. Larry McTiernan
15 May 2001
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Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

C:\AllTrillium\Roux SedTransport\2381SV

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2381A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	J ^{1,2} , R ^{1,2}
SW-09	AQ	J ^{1,2,3} , R ²

AQ - aqueous

A = Accept the results for the sample.

J¹ = Estimate (UJ) the results for benzyl alcohol, benzoic acid, and hexachlorocyclopentadiene due to a high percent difference in the associated continuing calibration standard.

J² = Estimate (J, UJ) the results for 2,4-dinitrophenol and 2,4,5-trichlorophenol due to poor recoveries in the laboratory fortified blank.

J³ = Estimate (UJ) the result for pentachlorophenol due to no recovery in the laboratory fortified blank but acceptable recoveries in the matrix spikes using this sample.

R¹ = Reject (R) result for pentachlorophenol due to no recovery in the laboratory fortified blank.

R² = Reject (R) the results for benzoic acid due to no recovery in the laboratory fortified blank.
Note: this qualifier takes precedence over the "UJ" qualifier applied to this analyte above.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2381A
Overall Evaluation of Data**

Semivolatile Organic Compounds (SVOCs)					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <p>1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site.</p> <p>2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events.</p> <p>3. Be representative of the actual site conditions and comparable to other data generated in support of this project.</p>	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>J^{1,2,3} R^{1,2}</p>	<p>None</p>		<p>1. Lack of recovery of pentachlorophenol in the laboratory fortified blank analysis renders the result for this compound unusable in SW-04. Acceptable MS/MSD recoveries for this compound led to qualification of the result for pentachlorophenol in SW-09 as estimated, rather than rejected.</p> <p>2. Lack of recovery of benzoic acid in the laboratory fortified blank analysis renders results for this compound unusable in both samples.</p> <p>3. Results for 2,4-dinitrophenol and 2,4,5-trichlorophenol in both samples were estimated due to poor laboratory fortified blank recoveries.</p> <p>4. Results for three target analytes were estimated due to calibration variability.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J** = The associated numerical value is an estimated quantity.
- R** = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U** = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ** = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name STL Connecticut SOW/Method No. EPA 8270 C
Case/Project No. _____ Sampling Date(s) 10/19-20/00
SDG No. 7000-2381A Shipping Date(s) 10/20/00
No. of Samples/Matrix 11/AQ Date Rec'd by lab 10/21/00
Traffic Report Sample Nos. SW-01, SW-02, SW-03, SW-04, SW-05,
SW-06, SW-07, SW-08, SW-09, SW-10
Trip Blank No. _____
Equipment Blank No. Field Blank
Bottle Blank No. _____
Field Duplicate Nos. SW-01/SW-10
PES Nos. _____

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation

SW-04 and SW-09 only

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

- A - Acceptable Data
- J - Numerical value associated with compound is an estimated quantity.
- R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
- U - Compound not detected at that numerical sample quantitation limit.
- UJ - The sample quantitation limit is an estimated quantity.
- TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carol Erikson Company Name Trillium, Inc Phone Number 865-946-8880

Date Validation Started 5/14/01 Date Validation Completed 5/15/01

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	✓
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	✓
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	✓
VOA/SV-III	INITIAL CALIBRATION	
VOA/SV-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NA
SV-VI	SV SURROGATE SPIKE RECOVERIES	✓
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	✓
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	✓
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	✓
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NA
VOA/SV-XV	SEMIVOLATILE CLEANUP	NA
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: CA Erikson

Name: Carol A. Erikson

Date: 5/14/01

EPA-NE - Data Validation Worksheet
VOA/SV-III

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

[illegible]

Validator: CAE 5/14/01

Date: _____

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

Validator: CAGUKS00

12/96

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Sampler: Chris Milone Company: Roux Assoc., Inc.

Contacted: Yes ☒ No ☐ Date: _____

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
10/26/00	11/2/00	SV/AQ	5BLKLG/method	HP5971Q	DEP	0.4 µg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
10/26/00	11/2/00	SV/AQ	Field Blank	HP5971Q	B2EHP	1 µg/L

Validator: Cafrickson

Date: 5/14/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-B

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
DEP	Method	10/20/00	0.4 µg/L	4 µg/L	10	SW-04, -09	None - ND
B2EHP	Field	10/20/00	1 µg/L	10 µg/L	10	" "	None - ND

Comments: _____

Validator: CA Erikson

Date: 5/14/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? @ 40/120 ug/L Y N
- Does it contain all target compounds at the method-required QLs? Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can't tell N

Matrix	Compound	Method QC Limits Other: < 60% or > 140%	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AQ	benzoic acid	0.9% (QC 0-25%)	—	SW-04, -09	R
AQ	2,4,5-trichlorophenol	58% (QC 71-124%)	—	" "	UJ
AQ	2,4-dinitrophenol	35% (QC 70-139%)	—	" "	UJ
AQ	pentachlorophenol	0.7% (QC 63-125%)	—	" "	R-SW-04 UJ-SW-09

Validator: QA Grikson

Date: 5/14/01

Post-Turnover Storm



TRILLIUM INC.
Consultants in Environmental Chemistry

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cerikson@trilliuminc.com

May 18, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2957A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 1/Surface Water/SW-09
1/Field Blank
Selected Total Metals: 2/Surface Waters/SW-01, SW-10
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 3/Surface Waters/SW-01, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 3/Surface Waters/SW-01, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for one surface water sample collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

HOME OFFICE:

28 GRACE'S DRIVE • COATESVILLE, PA 19320 • (610) 383-7233 • FAX (610) 383-7907

OFFICES IN:

LOUISIANA • MARYLAND • NEW JERSEY • NORTH CAROLINA • PENNSYLVANIA • TENNESSEE • TEXAS

Mr. Larry McTiernan

18 May 2001

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- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - * • Preservation and Technical Holding Times.
 - * • Instrument Calibration.
 - Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - * • Inductively Coupled Plasma (ICP) Interference Check Samples.
 - * • Matrix Spike (MS).
 - * • Laboratory Duplicates.
 - Field Duplicates.
 - * • Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
 - * • Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis

Mr. Larry McTiernan
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includes unacceptable CRDL standard recoveries for thallium and lead and laboratory blank contamination. There was one major impact on data usability.

- The result for copper in SW-09 was qualified as less than the reported value based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

- Results for calcium and magnesium in SW-09 were qualified as less than the reported values based on field blank contamination.

Total Suspended Solids (TSS)

Sample results for TSS were qualified as the result of measurement error, which in this case includes only sampling (field) error, or, more specifically, unacceptable field duplicate comparisons. There were no major impacts on data usability.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 12/20/00, via facsimile on 5/17/01. This document confirmed that all samples for metals analysis were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

CRDL Standards

The following analytes did not meet recovery criteria in the CRDL standard analyses.

Analyte	%REC	Limits	Action
lead	124.4, 134.5	80-120%	J
thallium	75.6	80-120%	UJ

Mr. Larry McTiernan
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Results for thallium and lead in SW-09 were less than 3xCRDL and were qualified as indicated above based on the unacceptable CRDL standard recoveries.

No CRDL standard was run for mercury in association with these sample analyses.

Blanks

The following analytes were detected in associated blanks:

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Barium	Field	3.0 µg/L	15.0 µg/L	None
Calcium	Field	18,000 µg/L	90,000 µg/L	U
Copper	Calibration	2.5 µg/L	12.5 µg/L	U
Magnesium	Field	2180 µg/L	10,900 µg/L	U
Manganese	Field	3.9 µg/L	19.5 µg/L	None
Potassium	Field	454 µg/L	2,270 µg/L	None
Sodium	Field	2700 µg/L	13,500 µg/L	None
Zinc	Field	7.8 µg/L	39.0 µg/L	None

Barium, manganese, potassium, sodium, and zinc were present in the sample at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Results for calcium, copper, and magnesium in SW-09 were qualified as less than the reported values (U) based on blank contamination.

Field Duplicates

The RPD for the following analyte was greater than the maximum acceptance criterion of 50 RPD:

Field Duplicate Pair	Analyte	RPD	Action
SW-01/SW-10	TSS	61.2	J

Mr. Larry McTiernan
18 May 2001
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One of the paired TSS results was below 5xCRDL, but the alternate acceptance criterion for low concentrations (\pm CRDL) was also not met. Therefore, the result for TSS in SW-09 was qualified as estimated (UJ) on this basis.

Serial Dilution

The serial dilution result for sodium was more than 10% different from the original, undiluted analysis result (10.9%). However, since the %D did not exceed 15%, no qualifiers were applied on this basis per Region I guidelines.

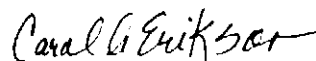
Sample Quantitation

Results for nickel and dissolved arsenic in SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/das



Mr. Larry McTiernan
18 May 2001
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STI, Connecticut Report #7000-2957A

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

\\Roux SedTransport\2957in.wpd

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2957A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-09	AQ	A ¹ , J ^{1,2}	J ³	J ⁴

AQ - aqueous

A = Accept the results for the sample.

A¹ = Accept the results for the sample, but qualify the positive results for calcium, copper, and magnesium as not detected (U) due to blank contamination.

J¹ = Estimate (J, UJ) the results for lead and thallium due to unacceptable CRDL standard recoveries.

J² = Estimate (J) the result for nickel because it is less than twice the applicable instrument detection limit.

J³ = Estimate (J) the result for dissolved arsenic because it is less than twice the applicable instrument detection limit.

J⁴ = Estimate the result for TSS due to poor reproducibility in the associated field duplicate analyses.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2957A
Overall Evaluation of Data**

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids				
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**
		Analytical Error	Sampling Error*	
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J^{1,2,3}</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J⁴</p>	<ol style="list-style-type: none"> 1. Results for calcium, copper, and magnesium in SW-09 were qualified as less than the reported values due to blank contamination. 2. Results for lead and thallium in SW-09 were estimated due to unacceptable CRDL standard recoveries. 3. Results for nickel and dissolved arsenic in SW-09 were estimated because they were less than 2xIDL. 4. The result for TSS in SW-09 was estimated due to poor reproducibility in the associated field duplicate analyses.

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
INORGANIC DATA VALIDATION**

- J** = The associated value is an estimated quantity.
- R** = The data are unusable. (Note: Analyte may or may not be present).
- U** = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ** = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

(ug/L)

STL Report No. 7000-2957A

Roux SedTransport\2957in

(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2957A

[illegible]

Roux SedTransport\2957in2

(mg/L)

STL Report No. 7000-2957A

[illegible]

Roux SedTransport\2957tss

REGION I
Data Review Worksheets

Site Name Industri-Plex
Reference Number _____

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

Trillium, Inc.
The (hardcopied (laboratory name) SL Connecticut data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No. 7000-2957A SAS No. _____ Sampling Date(s) 12/18/00
SDG. No. _____ Matrix AD Shipping Date(s) 12/19/00
No. of Samples 4 Date Rec'd by Lab 12/20/00

Traffic Report Nos: SW-01, SW-09, SW-10

Trip Blank No.: _____

Equipment Blank No.: Field Blank

Field Dup Nos: SW-01/SW-10

EPA 40100/7470A, 140.2
SOW No. _____ requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- | | |
|---------------------------------|------------------------------|
| -Data Completeness | -Field Duplicates |
| -Holding Times | -Lab Control Sample Results |
| -Calibrations | -Furnace AA Results |
| -Blanks | -ICP Serial Dilution Results |
| -ICP Interference Check Results | -Detection Limit Results |
| -Matrix Spike Recoveries | -Sample Quantitation |
| -Laboratory Duplicates | |

Overall Comments: Tier II Validation - SW-09 only

Definitions and Qualifiers:

- A - Acceptable data.
- J - Approximate data due to quality control criteria.
- R - Reject data due to quality control criteria.
- U - Analyte not detected.

Reviewer: Caenikson Date: 5/18/01

I. DATA COMPLETENESS

DATE REC'D

raw data OK per client - no action

sample pits	5/16/01	5/17/01
-------------	---------	---------

REGION I .

II. HOLDING TIMES

Complete table for all samples and circle the analysis date for samples not within criteria.

[illegible]

METALS - 180 DAYS FROM SAMPLE COLLECTION
MERCURY - 28 DAYS FROM SAMPLE COLLECTION
CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

REGION I
Data Review Worksheets

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

- A. Did the laboratory use the proper number of standards for calibration as described in the SOW? Yes or No
- B. Were calibrations performed at the beginning of each analysis? Yes or No
- C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent? Yes or No
- D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN ≥ 0.995 ? *not doc'd* Yes or No
- E. Was a standard at 2xCRDL analyzed for all ICP analyses? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

CRDL Std:	Pb	124.4 %	134.5 %
	Tl	75.6 %	

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
<u>1/9/01</u>	<u>CCB2</u>	<u>—</u>	<u>Zn</u>	<u>6.7 µg/L</u>
	<u>CCB4</u>	<u>—</u>	<u>Cu</u>	<u>2.5 µg/L</u>

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
<u>12/18/00</u>	<u>Field Blank</u>	<u>Ba</u>	<u>3.0 µg/L</u>
		<u>Ca</u>	<u>18,000 µg/L</u>
		<u>Mg</u>	<u>2180 µg/L</u>
		<u>Mn</u>	<u>3.9 µg/L</u>
		<u>K</u>	<u>454 µg/L</u>
		<u>Na</u>	<u>2700 µg/L</u>
		<u>Zn</u>	<u>7.8 µg/L</u>

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
<u>Ca</u> ^{FB}	<u>18,000 µg/L</u>	<u>90,000 µg/L</u>
<u>Cu</u> ^{CCB}	<u>2.5 µg/L</u>	<u>12.5 µg/L</u>
<u>Ba</u> ^{FB}	<u>3.0 µg/L</u>	<u>15.0 µg/L</u>
<u>Mg</u> ^{FB}	<u>2180 µg/L</u>	<u>10,900 µg/L</u>
<u>Mn</u> ^{FB}	<u>3.9 µg/L</u>	<u>19.5 µg/L</u>
<u>K</u> ^{FB}	<u>454 µg/L</u>	<u>2270 µg/L</u>
<u>Na</u> ^{FB}	<u>2700 µg/L</u>	<u>13,500 µg/L</u>

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
<u>Zn</u> ^{FB}	<u>7.8 µg/L</u>	<u>39.0 µg/L</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in µg/L X $\frac{\text{Volume diluted to (200ml)}}{\text{Weight digested (1gram)}}$ X $\frac{1L}{1000ml}$ X $\frac{1000gm}{1kg}$ X $\frac{1mg}{1000ug}$ = mg/kg

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I
Data Review Worksheets

VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the CRDL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate the precision by circling either the RPD or CRDL for each element.

MATRIX: AQ

Element	CRDL		Sample # <u>SW-01</u>	Duplicate# <u>SW-10</u>	RPD	Action
	water ug/L	soil mg/kg				
Aluminum	200					
Antimony	60					
Arsenic	10					
Barium	200					
Beryllium	5					
Cadmium	5					
Calcium	5000					
Chromium	10					
Cobalt	50					
Copper	25					
Iron	100					
Lead	5					
Magnesium	5000					
Manganese	15					
Mercury	0.2					
Nickel	40					
Potassium	5000					
Selenium	5					
Silver	10					
Sodium	5000					
Thallium	10					
Vanadium	50					
Zinc	20					
Cyanide	10					

Field Duplicate Actions should be applied to all other samples of the same matrix type. *135 5 13.6 25.6 61.2 also outside CRDL*

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >30% for waters and >50% for soils.
2. If sample results are less than 5x the CRDL, estimate (J) positive results and (UJ) nondetected results for elements whose absolute difference is >2xCRDL, (4xCRDL for soils). If both samples are non-detected, the RPD is not calculated (NC).

REGION I
Data Review Worksheets

XI. INDUCTIVELY COUPLED PLASMA (ICP) SERIAL DILUTION ANALYSIS

Serial Dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis.

Serial Dilutions were not performed for the following:

✓

Serial Dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x the IDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: AQ

ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	%D	ACTION
---------	-----	--------	------------------	--------------------	----	--------

Aluminum						
Barium						
Beryllium						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Nickel						
Potassium						
Silver						
Sodium	50	2500	81,220	90,075	10.9	None (<15%)
Vanadium						
Zinc						

Actions apply to all samples of the same matrix.

ACTIONS:

1. Estimate (J) positive results if %D >15.



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Consultants in Environmental Chemistry

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cerikson@trilliuminc.com

May 15, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2957A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 3/Surface Waters/SW-01, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for one surface water sample collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Additional samples were also reported in this data package, but, per project specifications, only the results for SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- * • Initial and Continuing Calibration.

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Mr. Larry McTiernan
15 May 2001
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- Blanks.
 - * • Surrogate Compounds.
 - * • Internal Standards.
 - * • Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
 - * • Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
 - NA • PE Samples/Accuracy Check.
 - NA • Target Compound Identification.
 - NA • Sample Quantitation and Reported Quantitation Limits.
 - NA • SVOC and Pesticides Cleanup.
 - NA • System Performance.
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes method and field blank contamination and poor LFB performance. There was one major impact on data usability:

- The result for bis(2-ethylhexyl)phthalate was qualified as less than the sample-specific contract required quantitation limit due to method and field blank contamination.

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Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compounds were reported in the associated method and field blanks:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Field	1 µg/L	10 µg/L	U
isophorone	Field	0.9 µg/L	4.5 µg/L	None - ND

The result for bis(2-ethylhexyl)phthalate was qualified as less than the sample-specific contract required quantitation limit (CRQL) due to the associated blank contamination.

Laboratory Fortified Blank

Recovery of 2,4,5-trichlorophenol (65%; QC 71-124%) was unacceptably low in the laboratory fortified blank analysis. The result for 2,4,5-trichlorophenol in SW-09 was qualified as estimated (UJ) on this basis.

Compared to the laboratory-specific acceptance limits, an unacceptably high recovery of benzoic acid (38%; QC 0-25%) was reported in the laboratory fortified blank analysis. No action was taken on this basis, however it is worth noting that "acceptance" limits of 0-25% strongly suggest that this is not a good analytical method for this particular compound.



Mr. Larry McTiernan
15 May 2001
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STL Connecticut Report #7000-2957A

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson
Quality Assessment Manager

CAE/das

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

C:\AllTrillium\Roux SedTransport\2957SV

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2957A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-09	AQ	A ¹ , J ¹

AQ - aqueous

A¹ = Accept the results for the sample, but qualify the result for bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL due to blank contamination.

J¹ = Estimate (UJ) the result for 2,4,5-trichlorophenol due to poor recovery in the laboratory fortified blank.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7000-2957A
Overall Evaluation of Data**

Semivolatile Organic Compounds (SVOCs)					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <p>1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site.</p> <p>2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events.</p> <p>3. Be representative of the actual site conditions and comparable to other data generated in support of this project.</p>	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J¹</p>	<p>None</p>		<p>1. The result for bis(2-ethylhexyl)phthalate was qualified as less than the sample-specific CRQL due to blank contamination.</p> <p>2. The result for 2,4,5-trichlorophenol was estimated due to a poor laboratory fortified blank recovery.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J** = The associated numerical value is an estimated quantity.
- R** = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U** = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ** = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 1
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2957A

[illegible]

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\2957SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-2957A

[illegible]

* includes adjustment for use of a sample volume slightly smaller than 1000 mL.

Roux SedTransport\2957SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

1

STL Report #7000-2957A

Sample Number		SW-09							
Lab ID		002957A-02							
Dilution Factor*		1.00							
Date Sampled		18-Dec-00							
Date Extracted		22-Dec-00							
Date Analyzed		03-Jan-01							
CRQL**									
50	4,6-Dinitro-2-methylphenol								
10	N-Nitrosodiphenylamine								
10	4-Bromophenyl-phenylether								
10	Hexachlorobenzene								
50	Pentachlorophenol								
10	Phenanthrene								
10	Anthracene								
10	Di-n-butylphthalate								
10	Fluoranthene	0.6	J						
10	Pyrene	0.4	J						
10	Butylbenzylphthalate								
20	3,3'-Dichlorobenzidine								
10	Benzo(a)anthracene								
10	Chrysene								
10	bis(2-Ethylhexyl)phthalate	10	U						
10	Di-n-octylphthalate	0.3	J						
10	Benzo(b)fluoranthene								
10	Benzo(k)fluoranthene								
10	Benzo(a)pyrene								
10	Indeno(1,2,3-cd)pyrene								
10	Dibenz(a,h)anthracene								
10	Benzo(g,h,i)perylene								

* includes adjustment for use of a sample volume slightly smaller than 1000 ml.

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

\Roux SedTransport\2957SV

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name STL Connecticut
Case/Project No. _____
SDG No. 7000-2957A
No. of Samples/Matrix 4/AQ

SOW/Method No. EPA 8270C
Sampling Date(s) 10/18/01 12/18/00
Shipping Date(s) 12/14/00
Date Rec'd by lab 12/20/00

Traffic Report Sample Nos. SW-01, SW-09, SW-10

Trip Blank No. _____
Equipment Blank No. Field Blank
Bottle Blank No. _____
Field Duplicate Nos. SW-01 / SW-10
PES Nos. _____

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation

SW-09 only

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

- A - Acceptable Data
- J - Numerical value associated with compound is an estimated quantity.
- R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
- U - Compound not detected at that numerical sample quantitation limit.
- UJ - The sample quantitation limit is an estimated quantity.
- TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carol Erikson Company Name Trillium, Inc Phone Number 865 966 8880

Date Validation Started 5/14/01

Date Validation Completed 5/15/01

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	<input checked="" type="checkbox"/>
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	<input checked="" type="checkbox"/>
VOA/SV-III	INITIAL CALIBRATION	<input checked="" type="checkbox"/>
VOA/SV-IV	CONTINUING CALIBRATION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	<input checked="" type="checkbox"/>
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	<input checked="" type="checkbox"/>
SV-VI	SV SURROGATE SPIKE RECOVERIES	<input checked="" type="checkbox"/>
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	<input checked="" type="checkbox"/>
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	<input checked="" type="checkbox"/>
VOA/SV-XV	SEMIVOLATILE CLEANUP	<input checked="" type="checkbox"/>
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	<input checked="" type="checkbox"/>

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	<input checked="" type="checkbox"/>
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	<input checked="" type="checkbox"/>
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	<input checked="" type="checkbox"/>
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	<input checked="" type="checkbox"/>
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	<input checked="" type="checkbox"/>
Pest/PCB-III	INITIAL CALIBRATION	<input checked="" type="checkbox"/>
Pest/PCB-IV	CONTINUING CALIBRATION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	<input checked="" type="checkbox"/>
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	<input checked="" type="checkbox"/>
Pest/PCB-VII	PESTICIDE CLEANUP	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	<input checked="" type="checkbox"/>
Pest/PCB-XII	COMPOUND IDENTIFICATION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	<input checked="" type="checkbox"/>
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	<input checked="" type="checkbox"/>

I certify that all criteria were met for the worksheets checked above.

Signature: Carol A. Erikson

Name: Carol A. Erikson

Date: 5/14/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Sampler: Martin Haines Company: Roux Assoc., Inc.

Contacted: Yes ☒ No ☐ Date: _____

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
12/22/00	1/3/01	SV/AQ	5BLK16/method	HP5971Q	B2EHP	0.8 µg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
12/22/00	01/03/01	SV/AQ	Field Blank	HP5971Q	isophorone	0.9 µg/L
					B2EHP	1 µg/L

Validator: Greg K. Son

Date: 5/14/01

3. **Blank Actions** - List the maximum concentrations of blank compounds.

Comments: B2EHP also in MB @ 0.8 µg/L

Date: 5/14/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? Y N
- Does it contain all target compounds at the method-required QLs? Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AQ	245-trichlorophenol	6590 (QC 71-184)		SW-09	UJ
AQ	benzoic acid	3890 (QC 0-0590)		SW 09	None

Validator: CA Erikson

Date: 5/14/01

Spring Storm 1



TRILLIUM INC.
Consultants in Environmental Chemistry

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cerikson@trilliuminc.com

July 5, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-0698A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 1/Surface Water/SW-09
1/Field Blank
Selected Total Metals: 8/Surface Waters/SW-01, SW-02, SW-03, SW-05,
SW-06, SW-07, SW-09A, SW-10
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 7/Surface Waters/SW-01, SW-02, SW-03, SW-05, SW-07,
SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 9/Surface Waters/SW-01, SW-02, SW-03, SW-05,
SW-06, SW-07, SW-09, SW-09A, SW-10
(Field Duplicates: SW-01/SW-10)

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for nine surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction. For SW-01, SW-10, SW-02, SW-03, SW-05, SW-06, SW-07, and SW-09A, arsenic, chromium, lead, and mercury were reported for the total metals fraction; dissolved arsenic was analyzed and reported in all of these samples except SW-06 and SW-09A. TSS was analyzed and reported for all nine samples.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-

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Mr. Larry McTiernan
5 July 2001
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specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - * • Preservation and Technical Holding Times.
 - * • Instrument Calibration.
 - Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - Inductively Coupled Plasma (ICP) Interference Check Samples.
 - Matrix Spike (MS).
 - * • Laboratory Duplicates.
 - * • Field Duplicates.
 - * • Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
 - * • Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

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Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes unacceptable recoveries for lead, selenium, and thallium in the CRDL standards, unacceptable interference check sample results for copper, an unacceptable matrix spike recovery for selenium, unacceptable serial dilution results for potassium, sodium, and zinc, and laboratory blank contamination. There were several major impacts on data usability:

- Results for cobalt, nickel, potassium, silver, thallium, and vanadium in SW-09 were qualified as less than the reported values (U) due to laboratory blank contamination.
- Results for mercury in SW-10 and SW-05 were qualified as less than the reported values (U) due to laboratory blank contamination.
- The result for selenium in SW-09 was rejected (R) due to a very poor matrix spike recovery.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

- The result for copper in SW-09 was qualified as less than the reported value (U) based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

CRDL Standards

The following analytes did not meet recovery criteria in the CRDL standard analyses:

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Analyte	%REC	Limits	Action
selenium	78.2, 50.9%	80-120%	UJ
thallium	143, 135%	80-120%	J
lead	134%	80-120%	J

The positive results reported for thallium in SW-09 and for lead in SW-09, SW-03, and SW-09A were less than 3xCRDL and were qualified as estimated (J) based on the unacceptably high recoveries listed above.

Selenium was not detected above the IDL in SW-09 and was qualified as estimated (UJ) due to the unacceptably low recoveries listed above.

No CRDL standard was run for mercury in association with these sample analyses.

Blanks

The following analytes were detected in associated blanks.

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Antimony	Calibration	5.1 µg/L	25.5 µg/L	None
Barium	Field	2.1 µg/L	10.5 µg/L	None
Calcium	Field	1280 µg/L	6400 µg/L	None
Cobalt	Preparation	0.836 µg/L	4.2 µg/L	U
Copper	Field	1.4 µg/L	7.0 µg/L	U
Iron	Field	17.3 µg/L	86.5 µg/L	None
Magnesium	Field	255 µg/L	1275 µg/L	None
Manganese	Field	3.0 µg/L	15.0 µg/L	None
Mercury	Calibration	0.1 µg/L	0.5 µg/L	U
Nickel	Calibration	0.9 µg/L	4.5 µg/L	U
Potassium	Preparation	1206 µg/L	6030 µg/L	U
Silver	Preparation	1.199 µg/L	6.0 µg/L	U

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Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Sodium	Field	445 µg/L	2225 µg/L	None
Thallium	Calibration	9.0 µg/L	45.0 µg/L	U
Vanadium	Calibration	0.6 µg/L	3.0 µg/L	U
Zinc	Field	7.3 µg/L	36.5 µg/L	None

Barium, calcium, iron, magnesium, manganese, sodium, and zinc were present in SW-09 at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Antimony was not detected above the IDL in SW-09; therefore, no qualifiers were warranted for this element based on blank contamination.

Results for cobalt, copper, nickel, potassium, silver, thallium, and vanadium in SW-09 were qualified as less than the reported values (U) based on the associated blank contamination.

Results for mercury in SW-10 and SW-05 were qualified as less than the reported values (U) based on the associated blank contamination.

In one or more calibration blanks, copper, aluminum, beryllium, and cadmium gave responses that were greater than two times the applicable negative instrument detection limit (IDL). Since these negative responses may indicate the possibility of false negatives, results for beryllium and cadmium in SW-09 were qualified as estimated (UJ). The positive results reported in SW-09 for copper and aluminum were greater than four times the IDL, therefore no action was warranted based on the negative calibration blank responses.

ICP Interference Check Sample

Interference check sample results did not meet the acceptance criterion (80-120% Recovery) for copper (124.0% and 123.0%). The result for copper in SW-09 was qualified as estimated (J) on this basis.

Matrix Spike

An unacceptably low recovery (<30%) was obtained for selenium (22.4%) in the matrix spike analysis of SW-09. The result for selenium in SW-09 was rejected (R) as unreliable on this basis.

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Serial Dilution Analysis

Serial dilution results for potassium (50.6%), sodium (17.8%), and zinc (19.1%) were more than 10% different from the original, undiluted analysis results. Because all of these %D values exceeded 15%, results for potassium, sodium, and zinc in SW-09 were qualified as estimated (J).

Sample Quantitation

Results for total arsenic in SW-01 and for dissolved arsenic in SW-07 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit and were not otherwise qualified. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/ekd

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7001-0698A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Selected Metals	Dissolved Arsenic	TSS
SW-09	AQ	A ^{1,2} , J ^{1,2,3,4,5} , R ¹	NA	A	A
SW-01	AQ	NA	J ⁶	A	A
SW-02	AQ	NA	A	A	A
SW-03	AQ	NA	J ²	A	A
SW-05	AQ	NA	A ³	A	A
SW-06	AQ	NA	A	NA	A
SW-07	AQ	NA	A	J ⁷	A
SW-09A	AQ	NA	J ²	NA	A
SW-10	AQ	NA	A ³	A	A

AQ - aqueous

NA - not analyzed

A = Accept the results for the sample.

A¹ = Accept the results for the sample, but qualify the positive results for cobalt, nickel, potassium, silver, thallium, and vanadium as not detected (U) due to laboratory blank contamination.

A² = Accept the results for the sample, but qualify the positive result for copper as not detected (U) due to field blank contamination.

A³ = Accept the results for the sample, but qualify the positive results for mercury as not detected (U) due to laboratory blank contamination.

- J¹ = Estimate (J, UJ) the results for thallium and selenium due to unacceptable CRDL standard recoveries. The result for selenium in SW-09 was also rejected; the "R" qualifier takes precedence.
- J² = Estimate (J) the results for lead due to an unacceptably high recovery in the CRDL standard.
- J³ = Estimate (UJ) the results for beryllium and cadmium due to negative calibration blank responses.
- J⁴ = Estimate (UJ) the result for copper due to unacceptable interference check sample results.
- J⁵ = Estimate (J) the results for potassium, sodium, and zinc due to unacceptable serial dilution analysis results.
- J⁶ = Estimate (J) the result for total arsenic because it is less than twice the applicable instrument detection limit and was not otherwise qualified.
- J⁷ = Estimate (J) the result for dissolved arsenic because it is less than twice the applicable instrument detection limit and was not otherwise qualified.
- R¹ = Reject (R) the result for selenium due to an unacceptably low (<30%) recovery in the matrix spike analysis.

TAB II

INDUSTRI-PLEX SITE STL REPORT #7001-0698A Overall Evaluation of Data

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids				
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**
		Analytical Error	Sampling Error*	
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A^{1,3} J^{1,2,3,4,5,6,7} R¹</p>	<p>Refer to qualifications in Table I</p> <p>A²</p>	<ol style="list-style-type: none"> 1. Numerous results were qualified as not detected at the reported values due to laboratory and field blank contamination. 2. Results for thallium and selenium in SW-09 were qualified as estimated due to unacceptable CRDL standard recoveries. 3. Three sample results for lead were estimated due to a high recovery in one of the CRDL standard analyses. 4. Results for beryllium and cadmium in SW-09 were estimated due to negative calibration blank responses. 5. The result for copper in SW-09 was estimated due to interference check sample results. 6. Results for potassium, sodium, and zinc in SW-09 were estimated due to serial dilution results. 7. Two sample results were estimated because they were less than twice the IDL. 8. The result for selenium in SW-09 was rejected due to a very low matrix spike recovery.

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
INORGANIC DATA VALIDATION**

- J =** The associated value is an estimated quantity.
- R =** The data are unusable. (Note: Analyte may or may not be present).
- U =** The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ =** The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-0698A

CRDL	Sample Number	SW-09	
	Lab ID	010698A-01	
	Date Sampled	23-Mar-01	
200	Aluminum	163	
60	Antimony	3.6 U	
10	Arsenic	14.2	
200	Barium	26.7	
5	Beryllium	0.20 UJ	
5	Cadmium	0.30 UJ	
5000	Calcium	24800	
10	Chromium	2.3	
50	Cobalt	1.3 U	
25	Copper	6.6 UJ	
100	Iron	1490	
3	Lead	3.3 J	
5000	Magnesium	3560	
15	Manganese	219	
0.2	Mercury	0.10 U	
40	Nickel	2.7 U	
5000	Potassium	4780 UJ	
5	Selenium	R	
10	Silver	1.0 U	
5000	Sodium	46300 J	
10	Thallium	8.4 UJ	
50	Vanadium	1.4 U	
20	Zinc	82.2 J	

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DATA SUMMARY FORM: SELECTED TOTAL METALS
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-0698A

Sample Number Lab ID Date Sampled		SW-01	SW-10	SW-02	SW-03	SW-05	SW-06	SW-07	SW-09A
		010698A-02	010698A-03	010698A-04	010698A-05	010698A-06	010698A-07	010698A-08	010698A-09
		23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01
CRDL									
10	Arsenic	3.6 J	7.6	3.5 U	22.0	3.5 U	8.4	7.7	3.5 U
10	Chromium	33.3	33.9	1.2	3.6	14.0	23.8	7.0	1.8
3	Lead	34.9	35.2	1.8 U	3.0 J	28.8	63.1	12.6	2.5 J
0.2	Mercury	0.10 U	0.16 U	0.10 U	0.10 U	0.11 U	0.10 U	0.10 U	0.10 U

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-0698A

Sample Number		SW-09	SW-01	SW-10	SW-02	SW-03	SW-05	SW-07		
Lab ID		010698A-01	010698A-02	010698A-03	010698A-04	010698A-05	010698A-06	010698A-08		
Date Sampled		23-Mar-01	23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01		
CRDL										
10	Arsenic	8.6	3.5 U	3.5 U	3.5 U	10.6	3.5 U	3.7 J		

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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS
WATER SAMPLES
(mg/L)

Site Name: Industri-Plex

STL Report No. 7001-0698A

Sample Number	SW-09	SW-01	SW-10	SW-02	SW-03	SW-05	SW-06	SW-07	SW-09A
Lab ID	010698A-01	010698A-02	010698A-03	010698A-04	010698A-05	010698A-06	010698A-07	010698A-08	010698A-09
Date Sampled	23-Mar-01	23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01
CRDL									
5.0 TSS	7.2	62.8	80.6	21.6	35.6	87.2	351	65.8	5.0 U

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REGION I
Data Review Worksheets

Site Name Industri-Plex
Reference Number _____

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

Trillium, Inc.
The hardcopied (laboratory name) STL Connecticut data package received at ~~Region I~~ has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No. 7001-0698A SAS No. _____ Sampling Date(s) 3/23/01 & 3/26/01
SDG. No. _____ Matrix AQ Shipping Date(s) 3/23/01 & 3/26/01
No. of Samples 9 Date Rec'd by Lab 3/24/01 & 3/27/01

Traffic Report Nos: SW-09, SW-01, SW-10, SW-02, SW-03, SW-05,
SW-06, SW-07, SW-09A

Trip Blank No.: _____

Equipment Blank No.: Field Blank

Field Dup Nos: SW-01/SW-10

EPA 4010B/7470A/160.2
SOW No. _____ requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- | | |
|---------------------------------|------------------------------|
| -Data Completeness | -Field Duplicates |
| -Holding Times | -Lab Control Sample Results |
| -Calibrations | -Furnace AA Results |
| -Blanks | -ICP Serial Dilution Results |
| -ICP Interference Check Results | -Detection Limit Results |
| -Matrix Spike Recoveries | -Sample Quantitation |
| -Laboratory Duplicates | |

Overall Comments: Tier II validation - all samples.

Definitions and Qualifiers:

- A - Acceptable data.
- J - Approximate data due to quality control criteria.
- R - Reject data due to quality control criteria.
- U - Analyte not detected.

Reviewer: CEK/ser Date: 7/2/01

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION

DATE LAB CONTACTED

DATE REC'D

Raw Data acceptable to client - no action taken

[illegible]

REGION I
Data Review Worksheets

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

- A. Did the laboratory use the proper number of standards for calibration as described in the SOW? Yes or No
- B. Were calibrations performed at the beginning of each analysis? Yes or No
- C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent? Yes or No
- D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN ≥ 0.995 ? *not doc'd* Yes or No
- E. Was a standard at 2xCRDL analyzed for all ICP analyses? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

CRDL Std: Beginning -		Se	78.2%
		Tl	143.3%
Ending -		Pb	133.5%
		Se	50.9%
		Tl	135.2%

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/3/01	ICB	—	✓Ca	3.1 µg/L
↓	↓	—	✓Co	0.8
↓	↓	—	✓Mg	4.5
↓	↓	—	✓K	612.8
↓	↓	—	✓Ag	0.6
↓	↓	—	✓Na	37.1
↓	↓	—	✓Tl	5.8
↓	↓	—	✓V	0.6

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
3/20/01	FB	Mg	255 µg/L
↓	↓	Mn	3.0
↓	↓	✓K	483
↓	↓	✓Ag	0.67
↓	↓	Na	445

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/3/01	CCB 1	-	✓ Ca	6.8 µg/L
↓	↓	-	✓ Mg	7.2
↓	↓	-	✓ K	403.5
↓	↓	-	✓ Na	33.0
↓	CCB 2	-	✓ Sb	5.1
↓	↓	-	✓ Ca	5.7
		-	✓ Co	0.7

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
3/26/01	FB	✓ TI	7.4 µg/L
"	"	✓ Zn	7.3 µg/L

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/3/01	CCB2	—	✓ Mg	7.5 µg/L
—	—	—	✓ Hg	0.1
—	—	—	✓ Ni	0.9
—	—	—	✓ K	869.7
—	—	—	✓ Ag	0.9
—	—	—	✓ Na	51.4
—	—	—	✓ TL	5.5
—	—	—	✓ V	0.6

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/3/01	CCB3	—	✓ Ca	2.5 µg/L
↓	↓	—	✓ Mg	4.2
↓	↓	—	✓ Ni	0.8
↓	↓	—	✓ K	664.2
↓	↓	—	✓ Ag	0.8
↓	↓	—	✓ Na	44.6
↓	↓	—	✓ Tl	4.8

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/3/01	CCB4	-	✓ K	725.0 mg/L
↓	↓	-	✓ Na	63.5
↓	↓	-	✓ Tl	6.4
↓	↓	-	✓ V	0.5
4/3/01	CCB5	-	✓ Ca	11.2
11	11	-	✓ Mg	6.4 ↓

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/3/01	CCB5	—	✓ K	552.1 µg/L
↓	↓	—	✓ Ag	1.0
↓	↓	—	✓ Na	45.5
↓	↓	—	✓ TL	9.0
↓	↓	—	✓ V	0.5
↓	↓	—	✓ Zn	2.1

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks * responses > 2x (-IDL)

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
<u>4/3/01</u>	<u>ICB</u>	<u>-</u>	<u>✓Cu</u>	<u>-1.4</u>
<u>↓</u>	<u>CCB1</u>	<u>-</u>	<u>Cu</u>	<u>-2.3</u>
<u>↓</u>	<u>CCB2</u>	<u>-</u>	<u>Al</u>	<u>-89.2</u>
<u>↓</u>	<u>↓</u>	<u>-</u>	<u>Be</u>	<u>-0.3</u>
<u>↓</u>	<u>↓</u>	<u>-</u>	<u>✓Cu</u>	<u>-2.3</u>

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks *responses > 2x (-IDL)* MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
<u>4/3/01</u>	<u>CCB3</u>	<u>-</u>	<u>Cd</u>	<u>-0.6</u>
<u> </u>	<u>"</u>	<u>-</u>	<u>✓Cu</u>	<u>-1.8</u>
<u> </u>	<u>CCB4</u>	<u>-</u>	<u>✓Cu</u>	<u>-2.1</u>
<u>↓</u>	<u>CCB5</u>	<u>-</u>	<u>Cu</u>	<u>-2.0</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: AQ

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
FB <u>Ca</u> ^N	<u>1280 mg/L</u>	<u>6400 mg/L</u>	FB <u>Cu</u> ^N	<u>1.4 ug/L</u>	<u>7.0 ug/L</u>
PB <u>Co</u> ^N	<u>0.836</u>	<u>4.2</u>	FB <u>Fe</u> ^N	<u>17.3</u>	<u>86.5</u>
PB <u>K</u> ^N	<u>1206</u>	<u>6030</u>	FB <u>Mg</u> ^N	<u>255</u>	<u>1275</u>
PB <u>Ag</u> ^N	<u>1.199</u>	<u>6.0</u>	FB/CB <u>V</u> ^N	<u>0.6</u>	<u>3.0</u>
FB <u>Na</u> ^N	<u>445</u>	<u>2225</u>	FB <u>Mn</u> ^N	<u>3.0</u>	<u>15.0</u>
CB <u>Li</u> ^N	<u>9.0</u>	<u>45.0</u>	CB <u>Sb</u> ^N	<u>5.1</u>	<u>25.5</u>
FB <u>Ba</u> ^N	<u>2.1</u>	<u>10.5</u>	FB <u>Zn</u> ^N	<u>7.3</u>	<u>36.5</u>
CB <u>Hg</u> ^N	<u>0.1</u>	<u>0.5</u>	CB <u>Ni</u> ^N	<u>0.9</u>	<u>4.5</u>

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X $\frac{\text{Volume diluted to (200ml)}}{\text{Weight digested (1gram)}}$ X $\frac{1L}{1000ml}$ X $\frac{1000gm}{1kg}$ X $\frac{1mg}{1000ug}$ = mg/kg

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

responses > 2x (-IDL)

MATRIX: AQ

MATRIX: _____

	<u>ELEMENT</u>	<u>MAX. CONC./</u> <u>UNITS</u>	<u>AL/</u> <u>UNITS</u>		<u>ELEMENT</u>	<u>MAX. CONC./</u> <u>UNITS</u>	<u>AL/</u> <u>UNITS</u>
CB	Cu ^N	-2.3 <u>ug/L</u>					
CB	Al [•]	-89.2					
CB	Be [•]	-0.3					
CB	Cd [•]	-0.6					

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X $\frac{\text{Volume diluted to (200ml)}}{\text{Weight digested (1gram)}}$ X $\frac{1L}{1000ml}$ X $\frac{1000gm}{1kg}$ X $\frac{1mg}{1000ug}$ = mg/kg

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I
Data Review Worksheets

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED
4/3/01	Cu	124.0;123.0	None* UJ CAE 7/2/01	SW-09

ACTIONS: * SW-09 result for Cu "U" due to blank contamination

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent? Yes or No

If no,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

REGION I
Data Review Worksheets

VI. MATRIX SPIKE

TR # SW-09

MATRIX: AQ

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spikes sample result
SR - sample result

Analyte	SSR	SR	S	%R	Action
<u>Se</u>	<u>2.23846</u>	<u>3.6 U</u>	<u>10</u>	<u>22.4</u>	<u>R</u> (SW-09)

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

- If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- If any analyte does not meet the %R criteria follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>125%
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	A

2. Frequency Criteria

A. Was a matrix spike prepared at the required frequency? Yes or No

B. Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery? Se - 10270R Yes or No

A separate worksheet should be used for each matrix spike pair.

01/21 1937/1P/CR



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July 5, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-0698A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 7/Surface Waters/SW-01, SW-10, SW-02, SW-03, SW-05, SW-07,
SW-09
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for seven surface water samples collected by Roux Associates, Inc., at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported. For the remaining samples, only the polynuclear aromatic hydrocarbons (PAHs), cyclohexanone, diethylphthalate, 4-methylphenol, and bis(2-ethylhexyl)phthalate were reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.

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Mr. Larry McTiernan

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5 July 2001

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- * • Initial and Continuing Calibration.
 - Blanks.
 - Surrogate Compounds.
 - * • Internal Standards.
 - * • Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
 - Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
 - NA • PE Samples/Accuracy Check.
 - NA • Target Compound Identification.
 - NA • Sample Quantitation and Reported Quantitation Limits.
 - NA • SVOC and Pesticides Cleanup.
 - NA • System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which includes analytical (laboratory) and sampling (field) error. Measurement error associated with sample analysis includes method blank contamination and poor laboratory fortified blank performance. There were two major impacts on data usability:

- The result for benzoic acid in SW-09 was rejected (R) because this compound was very poorly recovered in the laboratory fortified blank analysis.

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- The result for di-n-butyl phthalate in SW-09 was qualified as less than the sample-specific contract required quantitation limit (U) due to contamination in the associated method blank.

Measurement error associated with sample collection includes lack of comparability between paired field duplicate results and field blank contamination. Major impacts on data usability include the following:

- Results for butylbenzylphthalate and di-n-octylphthalate in SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- Results for phenanthrene, fluoranthene, pyrene, chrysene, and bis(2-ethylhexyl)phthalate in SW-09, SW-01, SW-10, SW-02, SW-03, and SW-07 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- Results for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)-fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene in SW-09, SW-01, SW-10, SW-03, and SW-07 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- Results for fluorene and dibenzo(a,h)anthracene in SW-01 were qualified as less than the sample-specific contract required quantitation limits (U) due to lack of confirmation in the field duplicate analysis.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compounds were reported in the associated method or field blanks:

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Compound	Blank Type	Max Conc.	Action Limit	Action
phenanthrene	Field	0.8 µg/L	4.0 µg/L	U
fluoranthene	Field	1.0 µg/L	5.0 µg/L	U
pyrene	Field	0.9 µg/L	4.5 µg/L	U
butylbenzylphthalate	Field	0.5 µg/L	5.0 µg/L	U
benzo(a)anthracene	Field	0.3 µg/L	1.5 µg/L	U
chrysene	Field	0.5 µg/L	2.5 µg/L	U
bis(2-ethylhexyl)phthalate	Field	3.0 µg/L	30 µg/L	U
di-n-octylphthalate	Field	11 µg/L	110 µg/L	U
benzo(b)fluoranthene	Field	0.6 µg/L	3.0 µg/L	U
benzo(k)fluoranthene	Field	0.5 µg/L	2.5 µg/L	U
benzo(a)pyrene	Field	0.4 µg/L	2.0 µg/L	U
indeno(1,2,3-cd)pyrene	Field	0.4 µg/L	2.0 µg/L	U
benzo(g,h,i)perylene	Field	0.4 µg/L	2.0 µg/L	U
di-n-butyl phthalate	Method	0.3 µg/L	3.0 µg/L	U

The following results were qualified as less than the sample-specific contract required quantitation limits (U) based on associated blank contamination:

- Results for di-n-butyl phthalate, butylbenzylphthalate, and di-n-octylphthalate in SW-09;
- Results for phenanthrene, fluoranthene, pyrene, chrysene, and bis(2-ethylhexyl)phthalate in SW-09, SW-01, SW-10, SW-02, SW-03, and SW-07; and
- Results for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)-fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene in SW-09, SW-01, SW-10, SW-03, and SW-07.

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Surrogates

An unacceptably low recovery (40%; QC 43-116%) was reported for 2-fluorobiphenyl in SW-03. Since only one surrogate recovery was unacceptable in this analysis, no qualifiers were warranted.

Field Duplicates

Positive results for fluorene (0.2 µg/L) and dibenzo(a,h)anthracene (0.3 µg/L) were reported in SW-01 but were not confirmed in SW-10 (10 U for both analytes). Based on professional judgement, results for fluorene and dibenzo(a,h)anthracene in SW-01 were qualified as less than the CRQLs (10 U) due to this lack of confirmation.

Laboratory Fortified Blank

Recovery of 4-methylphenol (45%) was unacceptably low (QC 48-95%) in the laboratory fortified blank analysis associated with SW-09, SW-01, and SW-10. Results for 4-methylphenol in SW-09, SW-01, and SW-10 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, very poor recovery was demonstrated for benzoic acid in the laboratory fortified blank analysis associated with SW-09, based on the validator's professional judgment (2%). The result for benzoic acid in SW-09 was rejected (R) on this basis.

Recovery of pentachlorophenol (132%) was unacceptably high (QC 63-125%) in the laboratory fortified blank analysis associated with SW-09. Pentachlorophenol was not detected in the associated sample, and no action was taken based on the high recovery.

Recoveries of diethylphthalate (55%; QC 62-132%) and 4-methylphenol (45%; QC 48-95%) were unacceptably low in the laboratory fortified blank analysis associated with SW-02, SW-03, SW-05, and SW-07. Results for diethylphthalate and 4-methylphenol in SW-02, SW-03, SW-05, and SW-07 were qualified as estimated (J, UJ) on this basis.

The laboratory should investigate the poor laboratory fortified blank recoveries and implement appropriate corrective action. Poor recoveries in a blank spike analysis are indicative of a potentially serious problem in the analytical process.

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Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.



Carol A. Erikson
Quality Assessment Manager

CAE/

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

C:\AllTrillium\Roux SepTransport\0698SV

TABLE I
INDUSTRI-PLEX SITE
STL Connecticut Report #7001-0698A
Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs	Selected SVOCs
SW-09	AQ	A ^{1,2,3,4} , J ¹ , R ¹	NA
SW-01	AQ	NA	A ^{3,4,5} , J ¹
SW-10	AQ	NA	A ^{3,4} , J ¹
SW-02	AQ	NA	A ³ , J ²
SW-03	AQ	NA	A ^{3,4} , J ²
SW-05	AQ	NA	J ²
SW-07	AQ	NA	A ^{3,4} , J ²

AQ - aqueous

NA = not analyzed

- A¹ = Accept the results for the sample, but qualify the result for di-n-butyl phthalate as not detected (U) at the sample-specific CRQL based on method blank contamination.
- A² = Accept the results for the sample, but qualify the results for butylbenzylphthalate and di-n-octylphthalate as not detected (U) at the sample-specific CRQL based on field blank contamination.
- A³ = Accept the results for the sample, but qualify the results for phenanthrene, fluoranthene, pyrene, chrysene, and bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL based on field blank contamination.
- A⁴ = Accept the results for the sample, but qualify the results for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene as not detected (U) at the sample-specific CRQL based on field blank contamination.

- A^S = Accept the results for the sample, but qualify the results for fluorene and dibenzo(a,h)anthracene as less than the sample-specific CRQL (10 U) due to lack of confirmation in the field duplicate analyses.
- J^1 = Estimate (UJ) the results for 4-methylphenol due to an unacceptably low recovery in the associated laboratory fortified blank analysis.
- J^2 = Estimate (J, UJ) the results for diethylphthalate and 4-methylphenol due to unacceptably low recoveries in the associated laboratory fortified blank analysis.
- R^1 = Reject (R) the result for benzoic acid due to very poor recovery (<10%) in the associated laboratory fortified blank.

TABLE II

INDUSTRI-PLEX SITE

STL REPORT #7001-0698A

Overall Evaluation of Data

Semivolatile Organic Compounds (SVOCs)					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <p>1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site.</p> <p>2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events.</p> <p>3. Be representative of the actual site conditions and comparable to other data generated in support of this project.</p>	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J¹ through J² R¹</p>	<p>None</p> <p>A² through A⁵</p>		<p>1. Very poor recovery of benzoic acid in the laboratory fortified blank analysis renders results for this compound unusable.</p> <p>2. Results for several PAH and phthalate target analytes were qualified as less than the CRQLs due to blank contamination.</p> <p>3. Results for fluorene and dibenzo(a,h)-anthracene in SW-01 were qualified as less than the CRQLs due to lack of field duplicate confirmation.</p> <p>4. Results for 4-methylphenol in all samples and for diethylphthalate in four samples were estimated due to unacceptably low recoveries in the LFB analysis.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J = The associated numerical value is an estimated quantity.
- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS I
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-0698A

Sample Number	SW-09				
Lab ID	010698A-01				
Dilution Factor*	1.00				
Date Sampled	23-Mar-01				
Date Extracted	27-Mar-01				
Date Analyzed	28-Mar-01				
CRQL**					
10 Cyclohexanone					
10 Phenol					
10 bis(2-Chloroethyl)ether					
10 2-Chlorophenol					
10 1,3-Dichlorobenzene					
10 1,4-Dichlorobenzene					
10 Benzyl alcohol					
10 1,2-Dichlorobenzene					
10 2-Methylphenol					
10 bis(2-chloroisopropyl)ether					
10 4-Methylphenol	UJ				
10 N-Nitroso-di-n-propylamine					
10 Hexachloroethane					
10 Nitrobenzene					
10 Isophorone					
10 2-Nitrophenol					
10 2,4-Dimethylphenol					
50 Benzoic acid	R				
10 bis(2-Chloroethoxy)methane					
10 2,4-Dichlorophenol					
10 1,2,4-Trichlorobenzene					
10 Naphthalene					

* where applicable, includes adjustment for use of a sample volume slightly smaller than 1000 mL.

\\Roux SedTransport\0698SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-0698A

Sample Number	SW-09				
Lab ID	010698A-01				
Dilution Factor*	1.00				
Date Sampled	23-Mar-01				
Date Extracted	27-Mar-01				
Date Analyzed	28-Mar-01				
CRQL**					
10	4-Chloroaniline				
10	Hexachlorobutadiene				
10	4-Chloro-3-methylphenol				
10	2-Methylnaphthalene				
10	Hexachlorocyclopentadiene				
10	2,4,6-Trichlorophenol				
50	2,4,5-Trichlorophenol				
10	2-Chloronaphthalene				
50	2-Nitroaniline				
10	Dimethylphthalate				
10	Acenaphthylene				
10	2,6-Dinitrotoluene				
50	3-Nitroaniline				
10	Acenaphthene				
50	2,4-Dinitrophenol				
50	4-Nitrophenol				
10	Dibenzofuran				
10	2,4-Dinitrotoluene				
10	Diethylphthalate	0.2	J		
10	4-Chlorophenyl-phenylether				
10	Fluorene				
50	4-Nitroaniline				

* where applicable, includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\0698SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7000-0698A

Sample Number	SW-09			
Lab ID	010698A-01			
Dilution Factor*	1.00			
Date Sampled	23-Mar-01			
Date Extracted	27-Mar-01			
Date Analyzed	28-Mar-01			
CRQL**				
50	4,6-Dinitro-2-methylphenol			
10	N-Nitrosodiphenylamine			
10	4-Bromophenyl-phenylether			
10	Hexachlorobenzene			
50	Pentachlorophenol			
10	Phenanthrene	10	U	
10	Anthracene	0.1	J	
10	Di-n-butylphthalate	10	U	
10	Fluoranthene	10	U	
10	Pyrene	10	U	
10	Butylbenzylphthalate	10	U	
20	3,3'-Dichlorobenzidine			
10	Benzo(a)anthracene	10	U	
10	Chrysene	10	U	
10	bis(2-Ethylhexyl)phthalate	10	U	
10	Di-n-octylphthalate	10	U	
10	Benzo(b)fluoranthene	10	U	
10	Benzo(k)fluoranthene	10	U	
10	Benzo(a)pyrene	10	U	
10	Indeno(1,2,3-cd)pyrene	10	U	
10	Dibenz(a,h)anthracene			
10	Benzo(g,h,i)perylene	10	U	

* where applicable, includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\0698SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

**DATA SUMMARY TABLE - SELECTED SEMIVOLATILE ORGANICS
WATER SAMPLES
(ug/L)**

Site Name: Industri-Plex

STL Report #7000-0698A

Sample Number	SW-01	SW-10	SW-02	SW-03	SW-05	SW-07		
Lab ID	010698A-02	010698-03	010698A-04	010698A-05	010698A-06	010698A-08		
Dilution Factor*	1.00	1.00	1.00	1.47	1.19	1.00		
Date Sampled	23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01		
Date Extracted	27-Mar-01	27-Mar-01	28-Mar-01	28-Mar-01	28-Mar-01	28-Mar-01		
Date Analyzed	28-Mar-01	28-Mar-01	03-Apr-01	03-Apr-01	03-Apr-01	03-Apr-01		
CRQL***								
10 Cyclohexanone					0.6 J	16		
10 4-Methylphenol	UJ	UJ	UJ	UJ	UJ	UJ		
10 Naphthalene								
10 2-Methylnaphthalene								
10 Acenaphthylene								
10 Acenaphthene								
10 Fluorene	10 U							
10 Diethylphthalate	0.2 J	0.2 J	1 J	UJ	UJ	0.3 J		
10 Phenanthrene	10 U	10 U	10 U	10 U		10 U		
10 Anthracene	0.3 J	0.2 J						
10 Fluoranthene	10 U	10 U	10 U	10 U		10 U		
10 Pyrene	10 U	10 U	10 U	10 U		10 U		
10 Benzo(a)anthracene	10 U	10 U		10 U		10 U		
10 Chrysene	10 U	10 U	10 U	10 U		10 U		
10 bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	10 U		10 U		
10 Benzo(b)fluoranthene	10 U	10 U		10 U		10 U		
10 Benzo(k)fluoranthene	10 U	10 U		10 U		10 U		
10 Benzo(a)pyrene	10 U	10 U		10 U		10 U		
10 Indeno(1,2,3-cd)pyrene	10 U	10 U		10 U		10 U		
10 Dibenzo(a,h)anthracene	10 U					0.4 J		
10 Benzo(g,h,i)perylene	10 U	10 U		10 U		10 U		

* includes adjustments for sample volumes slightly larger or smaller than 1000 mL

\Roux SedTransport\0698SV2

*** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name STL Connecticut
Case/Project No. _____
SDG No. 7001-0698A
No. of Samples/Matrix _____

SOW/Method No. EPA 8270C
Sampling Date(s) 3/23/01 and 3/26/01
Shipping Date(s) 3/23/01 and 3/26/01
Date Rec'd by lab 3/24/01 and 3/27/01

Traffic Report Sample Nos. SW-01, SW-02, SW-03, SW-05, SW-07, SW-09,
SW-10

Trip Blank No. _____
Equipment Blank No. Field Blank
Bottle Blank No. _____
Field Duplicate Nos. SW-01 / SW-10
PES Nos. _____

The Region I. EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation

all samples

The data were evaluated based upon the following parameters:

- | | |
|---|--|
| - Overall Evaluation of Data | - Field Duplicates |
| - Data Completeness (CSF Audit - Tier I) | - Sensitivity Check |
| - Preservation & Technical Holding Times | - PE Samples/Accuracy Check |
| - GC/MS & GC/ECD Instrument Performance Check | - Target Compound Identification |
| - Initial & Continuing Calibrations | - Compound Quantitation and Reported Quantitation Limits |
| - Blanks | - TICs |
| - Surrogate Compounds | - Semivolatile and Pesticide/PCB Cleanup |
| - Internal Standards | - System Performance |
| - Matrix Spike/Matrix Spike Duplicate | |

Region I Definitions and Qualifiers:

- A - Acceptable Data
J - Numerical value associated with compound is an estimated quantity.
R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
U - Compound not detected at that numerical sample quantitation limit.
UJ - The sample quantitation limit is an estimated quantity.
TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carol Erikson Company Name Trillium Inc Phone Number 865 966 8880

Date Validation Started 7/2/01

Date Validation Completed 7/5/01

Organic Fractions: SVOC

Date Received

Raw Data

acceptable to client - no action taken

Validator: MAE

Date: 7/2/01

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	<input checked="" type="checkbox"/>	CAC 9/21/01
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	<input checked="" type="checkbox"/>	
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	<input checked="" type="checkbox"/>	
VOA/SV-III	INITIAL CALIBRATION	<input checked="" type="checkbox"/>	
VOA/SV-IV	CONTINUING CALIBRATION	<input checked="" type="checkbox"/>	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS		
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS		
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NA	
SV-VI	SV SURROGATE SPIKE RECOVERIES		
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	<input checked="" type="checkbox"/>	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	<input checked="" type="checkbox"/>	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION		
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK		
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA	
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA	
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NA	
VOA/SV-XV	SEMIVOLATILE CLEANUP	NA	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA		

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: Carol A. Erikson

Name: Carol A. Erikson

Date: 7/5/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Sampler: Martin Haines - 3/23 Company: Roux

Contacted: Yes ☒ No ☐

Date: _____

"LC/HT" - 3/26

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
3/27/01	3/28/01	SV/AQ	SBLKNG	HP5971Q	DNBP	0.3 µg/L
"	"	"	"	"	B2EHP	0.7 µg/L
3/28/01	4/3/01	SV/AQ	SBLKPQ	HP5971Q	BBP	0.1 µg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
3/28/01	4/3/01	SV/AQ	FB	HP5971Q	phenanthrene	0.8 µg/L
					fluoranthene	1 µg/L
					pyrene	0.9 µg/L
					butylbenzylphthalate	0.5 µg/L
					benzo(a) anthracene	0.3 µg/L
					chrysene	0.5 µg/L
					B2EHP	3 µg/L

Validator: CA Erikson

DNBP 11 µg/L

benzo(b)fluoranthene 0.6 µg/L

benzo(k)fluoranthene 0.5 µg/L

benzo(a)pyrene 0.4 µg/L

Date: 7/2/01

indeno(1,2,3-cd)pyrene 0.4 µg/L
12/96

benzo(a)h)anthracene 0.4 µg/L

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-B

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
phenanthrene	Field	3/26/01	0.8 µg/L	4.0 µg/L	10	SW-09, -01, -10, -02, -03, -07	U
fluoranthene			1	5.0		SW-09, -01, -10, -02, -03, -07	U
pyrene			0.9	4.5		SW-09, -01, -10, -02, -03, -07	U
BBP			0.5	2.5 ^{0.05} _{7/2/01}		SW-09	U
benzo(a)anthr-			0.3	1.5		SW-09, -01, -10, -03, -07	U
chrysene			0.5	2.5		SW-09, -01, -10, -02, -03, -07	U
B2EHP			3	15 ^{3.0} _{0.05} _{7/2/01}		SW-09, -01, -10, -02, -03, -07	U
DNOP			11	55 ¹⁰		SW-09	U
benzo(b)fluoranth-			0.6	3.0		SW-09, -01, -10, -03, -07	U
benzo(k)fluoranth-			0.5	2.5		SW-09, -01, -10, -03, -07	U
benzo(a)pyrene			0.4	2.0		SW-09, -01, -10, -03, -07	U
indeno(1,2,3-cd)pyr-			0.4	2.0		SW-09, -01, -10, -03, -07	U
benzo(ghi)perylene			0.4	2.0		SW-09, -01, -10, -03, -07	U
DNBP	Method	3/27/01	0.3 µg/L	15 ^{3.0} _{0.05} _{7/2/01} µg/L	10	SW-09	U

Comments: _____

Validator: CA Erikson

Date: 7/2/01

EPA-NE - Data Validation Worksheet
SV-VI

VI. SV SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

Method	Base/Neutral Method QC Acceptance Criteria					
	NBZ-d ₅	2-FBP	TPH-d ₁₄	1,2-DCB-d ₄ *	Other:	
OLM03.2	Water Soil 35-114 23-120	✓Water Soil 43-116 30-115	Water Soil 33-141 18-137	Water Soil 16-110 20-130		
OLC02.1	40-110	30-110	20-140	NA		
Other:	43-116					
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	% Recovery	Action
SW-03 / AG	40	40				None

Method	Acid Method QC Acceptance Criteria					
	Phenol-d ₅	2-FP	2,4,6-TBP	2-CP-d ₄ *	Other:	
OLM03.2	Water Soil 10-110 24-113	Water Soil 21-110 25-121	Water Soil 10-123 19-122	Water Soil 33-110 20-130		
OLC02.1	15-115	15-110	15-130	NA		
Other:						
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	% Recovery	Action

* Advisory Surrogates - OLM03.2

Validator: CAEUKSON

Date: 7/2/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-IX

IX. FIELD DUPLICATE PRECISION - List all field duplicate analytes that are outside criteria.

Use a separate worksheet for each field duplicate pair.

Sample Number SW-01 Duplicate Sample Number SW-10 Matrix AQ

Parameter	Compound	Sample Conc.	Sample QL		Duplicate Conc.	Duplicate QL		RPD	QC Acceptance Criteria RPD or NA*	Action
			SQL	2xSQL		SQL	2xSQL			
SV	Fluorene	0.2 µg/L	10	20	ND	10	20	-	NA	U @ CRL
	DEP	0.2 µg/L			0.2 µg/L			Ø		none
	Anthracene	0.3 µg/L			0.2 µg/L			40		none
	dibenz(a,h)anthracene	0.3 µg/L			ND			-	NA	U @ CRL

* For instances where one duplicate result is ND (or reported less than the sample QL).

Does the MS/MSD data indicate acceptable laboratory precision?

(Y) N

Comments: _____

Sampler Name: _____ Contractor Name: _____ Date Contacted: _____

Reason for Contact and resolution obtained: _____

Validator: CE Date: 7/2/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? ☒ Y N
- Does it contain all target compounds at the method-required QLs? @ 40 µg/L or 120 µg/L (benz acid) Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can't tell Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
SBLK NQ	EX3/27/01				
AQ	4-MP	45% (QC 48-95%)		SW-09, -01, -10	UJ
	benzoic acid	0% (QC 0-25%)... PJ		SW-09	R
	PCP	132% (QC 63-125%)		SW-09	None

Validator: CAE

Date: 7/2/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? Y N
- Does it contain all target compounds at the method-required QLs? @40 ug/L Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can't tell Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
SBULK PQ	24 3/28/01			all 4/10/01	
AQ	DEP	55% (QC 62-132%)		SW-01, -02, -03, -05, -07	J, UJ
	4MP	45% (QC 48-95%)		SW-01, -02, -03, -05, -07	UJ
	(remaining compds "out" were not reported in assoc'd samples => no action)				

Validator: CEE

Date: 7/2/01

Spring Storm 2A



TRILLIUM INC.
Consultants in Environmental Chemistry

356 FARRAGUT CROSSING DR.
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FAX (423) 966-8885

cerikson@trilliuminc.com

September 5, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-0741A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 2/Surface Water/SW-04, SW-09
1/Field Blank
Selected Total Metals: 7/Surface Waters/SW-01, SW-02, SW-03, SW-05,
SW-06, SW-07, SW-10
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 7/Surface Waters/SW-01, SW-02, SW-04, SW-06, SW-07,
SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 9/Surface Waters/SW-01, SW-02, SW-03, SW-04,
SW-05, SW-06, SW-07, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
0/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc., at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fractions and arsenic only was reported for the dissolved fractions.

HOME OFFICE:

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Mr. Larry McTiernan
5 September 2001
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The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - Preservation and Technical Holding Times.
 - * • Instrument Calibration.
 - * • Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - * • Inductively Coupled Plasma (ICP) Interference Check Samples.
 - * • Matrix Spike (MS).
 - Laboratory Duplicates.
 - * • Field Duplicates.
 - * • Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
 - Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

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Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes laboratory blank contamination, lack of laboratory duplicate confirmation for selenium, and unacceptable serial dilution results for iron and potassium. Major impacts on data usability include:

- Results for cobalt in SW-04 and SW-09 were qualified as less than the reported values (U) based on calibration blank contamination.
- Results for chromium and iron in SW-04 and SW-09 were qualified as less than the reported values (U) based on preparation blank contamination.
- The result for selenium in SW-04 was qualified as less than the reported value (U) due to lack of confirmation in the laboratory duplicate analysis.

Measurement error associated with sample collection includes field blank contamination. Major impacts on data usability include:

- Results for barium, calcium, copper, magnesium, manganese, potassium, sodium, vanadium, and zinc in SW-04 and SW-09 were qualified as less than the reported values (U) due to field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No chain of custody records and no laboratory receipt records were included in the data package. The laboratory was contacted on 8/6/01 and asked to provide this documentation. On 8/15/01, the laboratory indicated that they were having difficulty locating the missing documentation and agreed to keep looking until they had exhausted all reasonable possibilities. On 8/30/01, after looking through a box of data retrieved from storage, they concluded the missing documentation had been misfiled and could not be found. While the absence of these records does not directly affect the validity of the analytical data generated, it does make it impossible to verify sample integrity from "cradle to grave," and would be problematic if the data were to be used in litigation. As an alternative, the following documentation was provided by the client: (1) copies of the chain of custody records prior to shipment of the samples to the laboratory; (2) copies of the three FedEx airbills used to ship the samples to the laboratory; and (3) print-outs of the FedEx on-line tracking/delivery information for each airbill. These chain of custody records verify collection of the samples. The airbills document shipment to the laboratory, although the absence of the airbill numbers on the chain of custody records substantially weakens this link. The on-line tracking print-outs verify

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delivery of the three shipments to the laboratory. Each was signed for by "A. Yowocoski." Based on clarification requested from P. Hobart at STL, this is the name of a person working in STLs sample receiving department and is correctly spelled "Yawarowski." Both client identifications and laboratory identifications are present on the Inorganic Analysis Data Sheets (Form Is) in the data package and on the "Sample Summary" listing on page 18 of the data package. These records provide the best available documented link between the samples sent to the laboratory and the results ultimately reported. The chain of custody records, airbill copies, and on-line tracking information copies were added to the data package as pages 19a through 19h by the validator. The data user is cautioned that while this is the best documentation available to verify sample integrity, it falls well short of ideal and would still very likely be problematic if the data were to be used in litigation.

Sample preservation with nitric acid could also not be verified by the validator due to the lack of sample receipt documentation. For the purposes of this evaluation, it was assumed that all samples were properly acidified to pH<2 based on Roux's policy of using only pre-preserved sample containers prepared by the laboratory.

Form 2B in the data package received for review contained incorrect true values for arsenic, lead, and selenium. The laboratory was notified of the apparent discrepancies on 8/7/01 and provided a corrected summary form on that same date. The corrected form was inserted into the data package as page 48 by the validator, replacing the originally provided page.

The instrument detection limit summary (Form 10) for instrument JA61 post-dated the analyses performed on this instrument and reported in this data package. The laboratory was notified of the discrepancy on 8/6/01 and provided a corrected Form 10 on 8/31/01. The corrected form was inserted into the data package as page 62 by the validator, replacing the originally provided page.

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following analytes were detected in associated blanks:

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Field	41.7 µg/L	209 µg/L	None
Antimony	Calibration	1.9 µg/L	9.5 µg/L	None
Barium	Field	8.9 µg/L	44.5 µg/L	U

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Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Calcium	Field	14,800 µg/L	74,000 µg/L	U
Chromium	Preparation	1.4 µg/L	7.0 µg/L	U
Cobalt	Calibration	0.70 µg/L	3.5 µg/L	U
Copper	Field	3.9 µg/L	19.5 µg/L	U
Iron	Preparation	274 µg/L	1370 µg/L	U
Magnesium	Field	2,510 µg/L	12,550 µg/L	U
Manganese	Field	35.6 µg/L	178 µg/L	U
Potassium	Field	1,560 µg/L	7,800 µg/L	U
Sodium	Field	23,000 µg/L	115,000 µg/L	U
Thallium	Calibration	9.0 µg/L	45.0 µg/L	None
Vanadium	Field	0.44 µg/L	2.2 µg/L	U
Zinc	Field	53.8 µg/L	269 µg/L	U

Aluminum was present in both samples at concentrations exceeding the action limit for this analyte; therefore, no qualifiers were warranted for aluminum based on blank contamination.

Antimony and thallium were not detected in either sample; therefore, no qualifiers were warranted for these elements based on blank contamination.

Results for barium, calcium, chromium, cobalt, copper, iron, manganese, magnesium, potassium, sodium, vanadium, and zinc in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

Laboratory Duplicates

Selenium was reported in SW-04 at a very low concentration (3.0 µg/L) but was not detected (2.6 U) in the laboratory duplicate analysis of this sample. The result for selenium in SW-04 was qualified as less than the reported value (U) based on this lack of duplicate confirmation.

Serial Dilution

Serial dilution results for iron (141%) and potassium (20%) were more than 10% different from the original, undiluted analysis results. Since the %Ds exceeded 15%, results for iron and potassium in SW-04 and SW-09 were qualified as estimated (J) on this basis, per Region I guidelines.

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Detection Limit Results

Instrument detection limits (IDLs) on Form 10 (instrument JA61) in the data package did not match the IDLs reported for undetected analytes in the samples. The Form 10 was also dated 4/17/01, which is after the reported total metals analyses were performed on this instrument. The laboratory was contacted on 8/6/01 and again on 8/28/01 and asked to clarify this discrepancy. A hand-corrected Form 10 was provided via facsimile on 8/31/01, with the date changed to 1/17/01.

Sample results reported for undetected target analytes were consistent with the hand-corrected IDLs provided by the laboratory on 8/31/01.

Sample Quantitation

The following validated dissolved results for arsenic were greater than validated total results for arsenic:

Sample	Total As (µg/L)	Dissolved As (µg/L)	%Difference	Action
SW-04	6.0	7.1	18.3%	J

Because the percent difference is greater than 10%, results for total and dissolved arsenic in SW-04 were qualified as estimated (J) based on the discrepancy between the measured total and dissolved concentrations.

Results for cadmium in SW-04 and for selenium and silver in SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit and were not otherwise qualified. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.



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Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson
Quality Assessment Manager

CAE/psn
#00662

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

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TABLE I

INDUSTRI-PLEX SITE

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Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ^{1,2} , J ^{1,2,3}	J ²	A
SW-09	AQ	A ¹ , J ^{1,4}	A	A

AQ - aqueous

A = Accept the results for the sample.

A¹ = Accept the results for the sample, but qualify the positive results for barium, calcium, chromium, cobalt, copper, iron, manganese, magnesium, potassium, sodium, vanadium, and zinc as not detected (U) due to blank contamination.

A² = Accept the results for the sample, but qualify the positive result for selenium as not detected (U) due to lack of confirmation in the laboratory duplicate analysis.

J¹ = Estimate (J) the results for iron and potassium due to unacceptable serial dilution analysis results.

J² = Estimate (J) the results for total and dissolved arsenic based on a discrepancy between the measured total and dissolved concentrations.

J³ = Estimate (J) the result for cadmium because it is less than twice the applicable instrument detection limit and was not otherwise qualified based on the validation effort.

J⁴ = Estimate (J) the results for selenium and silver because they are less than twice the applicable instrument detection limits and were not otherwise qualified based on the validation effort.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7001-0741A
Overall Evaluation of Data**

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids					
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A^{1,2} J^{1,2,3,4}</p>	<p>Refer to qualifications in Table I</p> <p>A¹</p>		<ol style="list-style-type: none"> 1. Results for barium, calcium, chromium, cobalt, copper, iron, manganese, magnesium, potassium, sodium, vanadium, and zinc in both samples were qualified as less than the reported values due to blank contamination. 2. The result for selenium in SW-04 was qualified as less than the reported value due to blank contamination. 3. Results for iron and potassium in both samples were estimated due to unacceptable serial dilution results. 5. Results for total and dissolved arsenic in SW-04 were estimated due to a discrepancy between the measured total and dissolved concentrations. 6. Results for cadmium in SW-04 and for selenium and silver in SW-09 were estimated because they are less than 2xIDL.

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

DATA SUMMARY KEY
INORGANIC DATA VALIDATION

- J** = The associated value is an estimated quantity.
- R** = The data are unusable. (Note: Analyte may or may not be present).
- U** = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ** = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7001-0741A

Sample Number		SW-04	SW-09
Lab ID		T010741A-08	T010741A-09
Date Sampled		29-Mar-01	29-Mar-01
CRDL			
200	Aluminum	255	364
60	Antimony	1.5 U	1.5 U
10	Arsenic	6.0 J	7.2
200	Barium	25.0 U	28.5 U
5	Beryllium	0.10 U	0.10 U
5	Cadmium	0.49 J	0.30 U
5000	Calcium	25900 U	25500 U
10	Chromium	4.1 U	3.3 U
50	Cobalt	1.2 U	1.2 U
25	Copper	13.6 U	12.4 U
100	Iron	881 UJ	1180 UJ
3	Lead	6.0	3.3
5000	Magnesium	3720 U	4060 U
15	Manganese	163 U	170 U
0.2	Mercury	0.10 U	0.10 U
40	Nickel	3.3	2.2
5000	Potassium	5100 UJ	5120 UJ
5	Selenium	3.0 U	2.7 J
10	Silver	0.40 U	0.51 J
5000	Sodium	57900 U	63400 U
10	Thallium	8.2 U	8.2 U
50	Vanadium	0.87 U	1.3 U
20	Zinc	193 U	202 U

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7001-0741A

Sample Number		SW-04		SW-09					
Lab ID		F010741A-08		F010741A-09					
Date Sampled		29-Mar-01		29-Mar-01					
CRDL									
10	Arsenic	7.1	J	4.2	U				

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WATER SAMPLES

(mg/L)

STL Report No. 7001-0741A

CRDL

5.0 TSS

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REGION I
Data Review Worksheets

Site Name Industri-Plex
Reference Number _____

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

Trillium, Inc.
The hardcopied (laboratory name) SL Connecticut data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No. 7001-0741A SAS No. _____ Sampling Date(s) 3/29/01
SDG. No. _____ Matrix AQ Shipping Date(s) _____
No. of Samples _____ Date Rec'd by Lab 4/3/01

Traffic Report Nos: SW-01, SW-02, SW-03, SW-05, SW-06, SW-07, SW-10, SW-04, SW-09

Trip Blank No.: _____

Equipment Blank No.: Field Blank

Field Dup Nos: SW-01/SW-10

EPA 6010B/7470A, 160.2

SOW No. _____ requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- | | |
|---------------------------------|------------------------------|
| -Data Completeness | -Field Duplicates |
| -Holding Times | -Lab Control Sample Results |
| -Calibrations | -Furnace AA Results |
| -Blanks | -ICP Serial Dilution Results |
| -ICP Interference Check Results | -Detection Limit Results |
| -Matrix Spike Recoveries | -Sample Quantitation |
| -Laboratory Duplicates | |

Overall Comments: Tier II evaluation - SW-04 and SW-09 only.

Definitions and Qualifiers:

- A - Acceptable data.
- J - Approximate data due to quality control criteria.
- R - Reject data due to quality control criteria.
- U - Analyte not detected.

Reviewer: Carol A. Erikson Date: 8/28/01

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
raw data	OK with client - no action	
COC, lab receipt records	8/6/01	*
Form 10 (IDLs) applicable to 4/12/01 analyses on JALe1	8/6/01 + 8/25/01	8/31/01

* COC and lab receipt records for this data set could not be located by the laboratory. Requested and received from client: (1) copies of COCs prior to shipment to lab; (2) copies of FedEx airbills; (3) FedEx delivery/tracking documentation. Also requested copies of field logs showing acidification of sp/s for metals analysis with HNO_3 , but this was not recorded. Assumed appropriate preservation per company policy of using only pre-preserved containers provided by the lab.

CAE:Kson
9/2/01

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/12/01	ICB, CCB3, CCB4	-	Ba	0.1, 0.1, 0.2 µg/L
	ICB, CCB1, CCB6	-	Ca	45.5, 22.8, 7.7 µg/L
	ICB, CCB1, CCB4	-	Co	0.6, 0.5, 0.7 µg/L
	ICB, CCB4	PBW	Mn	0.1, 0.4, 3.078 µg/L
	ICB, CCB3	-	Na	7.2, 8.9 µg/L
↓	ICB, CCB1	-	Zn	9.8, 1.6 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
3/29/01	Field Blank	Al	41.7 µg/L
		Ba	8.9 µg/L
		Ca	14,800 µg/L
		Cr	0.98 µg/L
		Cu	3.9 µg/L
↓	↓	Fe	216 µg/L

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AG

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/12/01	CCB1, CCB4, CCB5, CCB6	-	Sb	1.6, 1.5, 1.7, 1.9 µg/L
	CCB1, CCB6	-	Mg	11.9, 14.9 µg/L
	CCB2, CCB3, 4, 5, 6	-	K	39.6, 42.0, 52.4, 40.6, 50.1 µg/L
	CCB2	-	Tl	9.0 µg/L
	CCB6	-	Al	26.0 µg/L
	-	PBW	Cr	1.413 µg/L
	-	PBW	Fe	273.714 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
3/29/01	Field Blank	Mg	2510 µg/L
		Mn	35.6 µg/L
		K	1560 µg/L
		Na	23000 µg/L
		V	0.44 µg/L
		Zn	53.8 µg/L

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
Ba ^{FB}	8.9 µg/L	44.5 µg/L
Ca ^{FB}	14,800 µg/L	74,000 µg/L
Cr ^{PB}	1.4 µg/L	7.0 µg/L
Co ^{CB}	0.7 µg/L	3.5 µg/L
Cu ^{FB}	3.9 µg/L	19.5 µg/L
Al ^{FB}	41.7 µg/L	209 µg/L
Fe ^{PB}	273.7 µg/L	1370 µg/L
	274	
	02/28/7/01	

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
Mn ^{FB}	35.6 µg/L	178 µg/L
Mg ^{FB}	2510 µg/L	12,550 µg/L
K ^{FB}	1500 µg/L	7800 µg/L
Na ^{FB}	23,000 µg/L	115,000 µg/L
V ^{FB}	0.44 µg/L	2.2 µg/L
Zn ^{FB}	53.8 µg/L	269 µg/L
Sb ^{CB}	1.9 µg/L	9.5 µg/L
Tl ^{CB}	9.0 µg/L	45.0 µg/L

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X $\frac{\text{Volume diluted to (200ml)}}{\text{Weight digested (1gram)}}$ X $\frac{1L}{1000ml}$ X $\frac{1000gm}{1kg}$ X $\frac{1mg}{1000ug}$ = mg/kg

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I
Data Review Worksheets

VII. LABORATORY DUPLICATES

List the concentrations of any analyte not meeting the criteria for duplicate precision. For soil duplicates, calculate the CRDL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate precision by circling either the RPD or CRDL for each element.

MATRIX: AQ

Element	CRDL		Sample #	Duplicate#	RPD	Action
	water ug/L	soil mg/kg				
Aluminum	200					
Antimony	60					
Arsenic	10		5.9989	4.0823	38.0	None *
Barium	200					
Beryllium	5					
Cadmium	5					
Calcium	5000					
Chromium	10					
Cobalt	50		1.2009	1.4840	21.1	None *
Copper	25					
Iron	100					
Lead	5		6.0231	4.7763	23.1	None *
Magnesium	5000					
Manganese	15					
Mercury	0.2					
Nickel	40		3.3201	2.6761	21.5	None *
Potassium	5000					
Selenium	5		3.0011	2.644	"200"	U
Silver	10					
Sodium	5000					
Thallium	10					
Vanadium	50					
Zinc	20					
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of the same matrix type.

* all values $< 5 \times \text{CRDL}$ and paired results are within $\pm \text{CRDL}$.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD $> 20\%$ for waters and $> 35\%$ for soils.
2. If sample results are less than $5 \times$ the CRDL, estimate (J) positive results for elements whose absolute difference is $> \text{CRDL}$, ($2 \times \text{CRDL}$ for soils). If both samples are non-detected, the RPD is not calculated (NC).

REGION I
Data Review Worksheets

XI. INDUCTIVELY COUPLED PLASMA (ICP) SERIAL DILUTION ANALYSIS

Serial Dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis.

Serial Dilutions were not performed for the following:

Serial Dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x the IDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: Water

ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	%D	ACTION
Aluminum						
Barium						
Beryllium						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron	5.7	285	880.68	2122.48	141	J
Lead						
Magnesium						
Manganese						
Nickel						
Potassium	74.0	3700	5104.48	4082.59	20	J
Silver						
Sodium						
Vanadium						
Zinc						

Actions apply to all samples of the same matrix.

ACTIONS:

1. Estimate (J) positive results if %D >15.

REGION I
Data Review Worksheets

XII. DETECTION LIMIT RESULTS

1. Instrument Detection Limits

☒ Instrument Detection Limit results were present and found to be less than the Contract Required Detection Limits.

☐ IDLs were not included in the data package on Form XI.

☐ IDLs were present, but the criteria was not met for the following elements: _____

2. Reporting Requirements

☒ Were sample results on Form I reported down to the IDL not the CRDL for all analytes? Yes or No

☐ Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5x IDL. Yes or No *N/A*

☐ Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I. Yes or No

If No,

The reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

* IDLs reported on Form 10 for ICP JAL61 in data package as submitted did not match the IDLs reported for undetected analytes in the samples analyzed on this instrument. Laboratory provided a hand-corrected Form 10 on 8/31/01, indicating IDLs consistent with the reported values and an established date of 1/17/01 (instead of 4/17/01).

CAE 8/31/01

Spring Baseflow



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August 13, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
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Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-0830A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
Total TAL Metals: 2/Surface Water/SW-04, SW-09
1/Field Blank
Selected Total Metals: 3/Surface Waters/SW-01, SW-02, SW-10
(Field Duplicates: SW-01/SW-10)
Dissolved Arsenic: 5/Surface Waters/SW-01, SW-02, SW-04, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank
Total Suspended Solids: 5/Surface Waters/SW-01, SW-02, SW-04, SW-09,
SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc., at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fractions and arsenic only was reported for the dissolved fractions.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

HOME OFFICE:
28 GRACE'S DRIVE • COATESVILLE, PA 19320 • (610) 383-7233 • FAX (610) 383-7907
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Mr. Larry McTiernan

STL Connecticut Report #7001-0830A

13 August 2001

Page 2

- Overall Evaluation of Data and Potential Usability Issues.
 - Data Completeness.
 - * • Preservation and Technical Holding Times.
 - * • Instrument Calibration.
 - * • Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - Inductively Coupled Plasma (ICP) Interference Check Samples.
 - * • Matrix Spike (MS).
 - * • Laboratory Duplicates.
 - * • Field Duplicates.
 - * • Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
 - Detection Limit Results.
 - NA • PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
 NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes laboratory blank contamination, an unacceptable interference check sample result for

Mr. Larry McTiernan
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selenium, and an unacceptable serial dilution result for potassium. Major impacts on data usability include:

- Results for cobalt in SW-04 and SW-09 were qualified as less than the reported values (U) based on laboratory blank contamination.
- The result for thallium in SW-09 was qualified as less than the reported value (U) based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. Major impacts on data usability include:

- Results for calcium, chromium, and magnesium in SW-04 and SW-09 were qualified as less than the reported values (U) based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

For the dissolved metals analyses, Form 13 indicated a preparation date of 4/18/01 and Form 14 indicated an analysis date of 4/17/01. The laboratory was contacted on 8/6/01 and asked to clarify this discrepancy. On 8/9/01, the laboratory responded via facsimile, explaining that "the Form 13 for dissolved metals was submitted in error. The filtered metals samples were not prepped. However, in order to process the data, a prep date had to be entered into the software program. Page 105 (the Form 13 for the Filtered metals) should be removed from the data package." Page 105 was, therefore, removed from the data package and replaced with a blank sheet containing the notation "This page intentionally left blank." No further action was taken on this basis.

Blanks

The following analytes were detected in associated blanks:

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Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Barium	Field	5.4 µg/L	27.0 µg/L	None
Calcium	Field	10,000 µg/L	50,000 µg/L	U
Chromium	Field	0.46 µg/L	2.3 µg/L	U
Cobalt	Preparation	0.68 µg/L	3.4 µg/L	U
Copper	Field	1.4 µg/L	7.0 µg/L	None
Iron	Field	32.4 µg/L	162 µg/L	None
Magnesium	Field	1,890 µg/L	9,450 µg/L	U
Manganese	Field	5.2 µg/L	26.0 µg/L	None
Potassium	Field	604 µg/L	3,020 µg/L	None
Silver	Preparation	0.48 µg/L	2.4 µg/L	None
Sodium	Field	9,160 µg/L	45,800 µg/L	None
Thallium	Preparation	4.8 µg/L	24.0 µg/L	U
Zinc	Field	9.9 µg/L	49.5 µg/L	None

Barium, copper, iron, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Silver was not detected in either sample and thallium was not detected in SW-04; therefore, no qualifiers were warranted for these elements in the indicated samples based on blank contamination.

Results for calcium, chromium, cobalt, and magnesium in SW-04 and SW-09 and for thallium in SW-09 were qualified as less than the reported values (U) based on blank contamination.

Interference Check Sample

An unacceptably low recovery (71.8%) was reported for selenium in the interference check sample analysis associated with the total metals analyses. Results for selenium in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Mr. Larry McTiernan

13 August 2001

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Serial Dilution

The serial dilution result for potassium was more than 10% different from the original, undiluted analysis result (17.6%). Since the %D exceeded 15%, results for potassium in SW-04 and SW-09 were qualified as estimated (J) on this basis, per Region I guidelines.

Detection Limit Results

Instrument detection limits (IDLs) on Form 10 in the data package did not match the IDLs reported for undetected analytes in the samples. The Form 10 was also dated 4/17/01, which is after the reported total metals analyses were performed and the same day as the reported dissolved metals analyses were performed. The laboratory was contacted on 8/6/01 and asked to clarify this discrepancy. A hand-corrected Form 10 was provided via facsimile on 8/9/01, but the date was not changed. Based on comparison to the Form 10 in the data package for #7001-0698A, the date was corrected to 1/15/01 by the validator.

Sample results reported for undetected target analytes were consistent with the corrected IDLs provided by the laboratory on 8/9/01.

Sample Quantitation

The following validated dissolved results for arsenic were greater than validated total results for arsenic:

Sample	Total As (µg/L)	Dissolved As (µg/L)	%Difference	Action
SW-04	6.9	11.2	62.3%	J
SW-09	3.5 U	3.8	--	J, UJ

Because the percent difference is greater than 10%, results for total and dissolved arsenic in SW-04 were qualified as estimated (J) based on the discrepancy between the measured total and dissolved concentrations. Since the positive result for total arsenic in SW-09 is less than twice the IDL, this discrepancy probably reflects the increased variability inherent in measurements at low concentrations. Results for total and dissolved arsenic in SW-09 were qualified as estimated (J, UJ) on this basis.

Results for cadmium in SW-09 and for vanadium in SW-04 and SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit and were not otherwise



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qualified. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson
Quality Assessment Manager

CAE/ekd
#00662

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Summary Tables
Data Validation (DV) Worksheets

\\Roux SedTransport\0830in.wpd

TABLE I

INDUSTRI-PLEX SITE
STL Connecticut Report #7001-0830A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ¹ , J ^{1,2,3,5}	J ³	A
SW-09	AQ	A ^{1,2} , J ^{1,2,3,4,5}	J ³	A

AQ - aqueous

A = Accept the results for the sample.

A¹ = Accept the results for the sample, but qualify the positive results for calcium, chromium, cobalt, and magnesium as not detected (U) due to blank contamination.

A² = Accept the results for the sample, but qualify the positive result for thallium as not detected (U) due to blank contamination.

J¹ = Estimate (UJ) the result for selenium based on an unacceptably low recovery in the associated interference check sample.

J² = Estimate (J) the result for potassium due to unacceptable serial dilution analysis results.

J³ = Estimate (J, UJ) the results for total and dissolved arsenic based on discrepancies between the measured total and dissolved concentrations.

J⁴ = Estimate (J) the result for cadmium it is less than twice the applicable instrument detection limit and was not otherwise qualified based on the validation effort.

J⁵ = Estimate (J) the result for vanadium it is less than twice the applicable instrument detection limit and was not otherwise qualified based on the validation effort.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7001-0830A
Overall Evaluation of Data**

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids				
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**
		Analytical Error	Sampling Error*	
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS)</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A^{1,2} J^{1,2,3,4,5}</p>	<p>Refer to qualifications in Table I</p> <p>A¹</p>	<p>1. Results for calcium, chromium, cobalt and magnesium in both samples were qualified as less than the reported values due to blank contamination.</p> <p>2. The result for thallium in SW-09 was qualified as less than the reported value due to blank contamination.</p> <p>3. Results for selenium in both samples were estimated due to an unacceptable interference check sample recovery.</p> <p>4. Results for potassium in both samples were estimated due to an unacceptable serial dilution result.</p> <p>5. Results for total and dissolved arsenic in both samples were estimated due to discrepancies between measured total and dissolved concentrations.</p> <p>6. Results for cadmium in SW-04 and for vanadium in both samples were estimated because they are less than 2xIDL.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
INORGANIC DATA VALIDATION**

- J** = The associated value is an estimated quantity.
- R** = The data are unusable. (Note: Analyte may or may not be present).
- U** = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ** = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

(ug/L)

STL Report No. 7001-0830A

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report No. 7001-0830A

CRDL	Sample Number Lab ID Date Sampled	SW-04		SW-09													
		F010830A-03		F010830A-04													
		5-Apr-01		5-Apr-01													
10	Arsenic	11.2	J	3.8	J												

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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS
WATER SAMPLES
(mg/L)

Site Name: Industri-Plex

STL Report No. 7001-0830A

Sample Number Lab ID Date Sampled		SW-04		SW-09									
		010830A-03		010830A-04									
		5-Apr-01		5-Apr-01									
CRDL													
5.0	TSS	5.0	U	5.0	U								

\\Roux SedTransport\0830tss

Site Name Industri-Plex
Reference Number _____

Trillium, Inc.

Case No. <u>7001-0830A</u>	SAS No. _____	Sampling Date(s) <u>4/5/01</u>
SDG. No. _____	Matrix <u>AG</u>	Shipping Date(s) <u>4/5/01</u>
No. of Samples <u>5</u>		Date Rec'd by Lab <u>4/6/01</u>

Traffic Report Nos: SW-01, SW-02, SW-04, SW-09, SW-10

Trip Blank No.: _____
Equipment Blank No.: Field Blank
Field Dup Nos: SW-01 / SW-10

EPA 6010B/7470A, 160.2
SOW No. requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Holding Times
- Calibrations
- Blanks
- ICP Interference Check Results
- Matrix Spike Recoveries
- Laboratory Duplicates
- Field Duplicates
- Lab Control Sample Results
- Furnace AA Results
- ICP Serial Dilution Results
- Detection Limit Results
- Sample Quantitation

Overall Comments: Tier II validation - SW-04 and SW-09 only

A - Acceptable data.
J - Approximate data due to quality control criteria.
R - Reject data due to quality control criteria.
U - Analyte not detected.

Reviewer: CA Erikson Date: 8/6/01
(CAE)

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION

DATE LAB CONTACTED

DATE REC'D

raw data

OK per client - no action

REGION I .
Data Review Worksheets

II. HOLDING TIMES

Complete table for all samples and circle the analysis date for samples not within criteria.

[illegible]

METALS - 180 DAYS FROM SAMPLE COLLECTION

MERCURY - 28 DAYS FROM SAMPLE COLLECTION

CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

Fax Cover Sheet

SEVERN

TRENT

SERVICES

Date: 8/9/01

To: Carol Ericson
Company: Trillium
Fax: 865-966-8885

STL Connecticut
128 Long Hill Cross Road
Shelton, CT 06484

Tel 203 929 8140
Fax 203 929 8142
www.stl-inc.com

Pages (Inc. cover sheet):

3

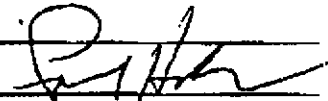
From: Paul Hobart
Direct Tel: 203-944-1307

Message: Roux Industrialplex Project

Attached is a corrected Form 10 for SDA A0830
and Form 2B for SDA A0741.

For SDA A0830, the Form 13 was submitted for dissolved metals
was submitted in error. The filtered metals samples
were not prepped. However, in order to process the data,
a prep date had to be entered into the software
program. Page 105 (the Form 13 for the Filtered
metals) should be removed from the data package.

I will fax the sample receiving information for SDA
A0741 as soon as possible.



Confidentiality Notice: The information contained in the Facsimile message is privileged and confidential information intended only for the use of the addressee. If the reader of this message is not the intended recipient, or the employee or agent responsible to deliver to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone and please return the original message to us at the above address via the U.S. Postal Service.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/12/01	CCB	—	K	140.7 µg/L
↓	↓	—	Na	10.9 µg/L
↓	↓	—	Cu	0.3 µg/L
↓	↓	—	K	120.2 µg/L
↓	↓	—	Na	14.1 µg/L
↓	↓	—	Ca	2.6 µg/L
↓	↓	—	Fe	6.1 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
4/5/01	Field Blank	Mn	5.2 µg/L
↓	↓	K	602 µg/L
↓	↓	Na	9140 µg/L
↓	↓	Zn	9.9 µg/L

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/12/01	ICB	—	K	201.6 µg/L
	ICB	—	Na	14.0 µg/L
	CCB	—	Ca	5.4 µg/L
		—	Mg	4.1 µg/L
		—	K	195.1 µg/L
			Na	12.3 µg/L
			Na	10.1 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Laboratory Blanks

MATRIX: AQ

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
4/12/01	CCB	—	Mg	4.3 µg/L
	↓	—	Mn	0.2 µg/L
	↓	—	K	75.4 µg/L
	↓	—	Na	10.2 µg/L
	PBW	PBW	Co	0.682 µg/L
			K	217.03 µg/L
			Ag	0.488 µg/L
			Na	8.975 µg/L
			TL	4.835 µg/L

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS
4/5/01	Field Blank	Ba	5.4 µg/L
		Co	10,000 µg/L
		Cr	0.46 µg/L
		Cu	1.4 µg/L
		Fe	32.4 µg/L
		Mg	1890 µg/L

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
^{FB} Ca	10,000 µg/L	50,000 µg/L
^{FB} Cr	0.46 µg/L	2.3 µg/L
^{PB} Co	0.682 µg/L	3.4 µg/L
• ^{FB} Cu	1.4 µg/L	7.0 µg/L
• ^{FB} Ba	5.4 µg/L	27 µg/L
• ^{FB} Iron	32.4 µg/L	162 µg/L
• ^{PB} Potassium	604 µg/L	3020 µg/L

MATRIX: AQ

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
^{FB} Mg	1890 µg/L	9450 µg/L
• ^{FB} Mn	5.2 µg/L	26 µg/L
- ^{PB} Ag	0.482 µg/L	2.4 µg/L
• ^{FB} Na	9160 µg/L	45800 µg/L
• ^{PB} Tl	4.835 µg/L	24.2 µg/L
• ^{FB} Zn	9.9 µg/L	49.5 µg/L

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in µg/L X $\frac{\text{Volume diluted to (200ml)}}{\text{Weight digested (1gram)}}$ X $\frac{1L}{1000ml}$ X $\frac{1000gm}{1kg}$ X $\frac{1mg}{1000ug}$ = mg/kg

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I
Data Review Worksheets

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED
4/12/01	Se	71.8	UJ	SW-04, SW-09
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ACTIONS:

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?

Yes or No

If no,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

REGION I
Data Review Worksheets

XI. INDUCTIVELY COUPLED PLASMA (ICP) SERIAL DILUTION ANALYSIS

Serial Dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis.

Serial Dilutions were not performed for the following:

Serial Dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x the IDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: AQ

ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	%D	ACTION
Aluminum						
Barium						
Beryllium						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Nickel						
Potassium	110.2	5810	6891.82	5677.62	17.6	J
Silver						
Sodium						
Vanadium						
Zinc						

Actions apply to all samples of the same matrix.

ACTIONS:

1. Estimate (J) positive results if %D >15.

REGION I
Data Review Worksheets

XII. DETECTION LIMIT RESULTS

1. Instrument Detection Limits

✓ * Instrument Detection Limit results were present and found to be less than the Contract Required Detection Limits.

 IDLs were not included in the data package on Form XI.

_____ IDLs were present, but the criteria was not met for the following elements: _____

2. Reporting Requirements

* Were sample results on Form I reported down to the IDL not the CRDL for all analytes?

Yes or No

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5x IDL.

- Yes or No N/A

Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I.

Yes or No

If No.

The reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

* IDs reported on Form 10 in data package as submitted did not match the IDs reported for undetected analytes. Laboratory provided a hand-corrected Form 10 on 8/9/01, but date still indicated IDs established on 4/17/01, which is after these analyses were performed.

Based on comparison to Fm10 in pkg 7001-0698A,
the date was corrected to 1/15/01 by the evaluator.



TRILLIUM INC.
Consultants in Environmental Chemistry

356 FARRAGUT CROSSING DR.
KNOXVILLE, TN 37922

[423] 966-8880
FAX (423) 966-8885
cerikson@trilliuminc.com

August 6, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-0830A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 5/Surface Waters/SW-01, SW-02, SW-04, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)
1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- Initial and Continuing Calibration.

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Mr. Larry McTiernan
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STL Connecticut Report #7001-0830A

- Blanks.
 - * • Surrogate Compounds.
 - * • Internal Standards.
 - * • Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
 - * • Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
 - NA • PE Samples/Accuracy Check.
 - NA • Target Compound Identification.
 - NA • Sample Quantitation and Reported Quantitation Limits.
 - NA • SVOC and Pesticides Cleanup.
 - NA • System Performance.
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which includes analytical (laboratory) and sampling (field) error. Measurement error associated with sample analysis includes an unacceptable initial calibration response and poor laboratory fortified blank performance. There was one major impact on data usability:

- Results for benzoic acid in SW-04 and SW-09 were rejected (R) as unreliable due to very poor recovery in the laboratory fortified blank analysis.

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Measurement error associated with sample collection includes field blank contamination. Major impacts on data usability include the following:

- Results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and diethylphthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- The result for cyclohexanone in SW-09 was qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Calibration

Compounds that did not meet criteria in the initial calibration are summarized in the following table.

Instrument ID:	HP5971Q	Action		Affected Samples
Compound	IC 4/19/01	Positive Detects	NDs	
cyclohexanone	%RSD=35.0%	J	UJ	SW-04, SW-09

Sample results will be qualified as indicated above.

Blanks

The following compounds were reported in the associated method and/or field blanks:

Mr. Larry McTiernan
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Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Field	0.6 µg/L	6 µg/L	U
di-n-butylphthalate	Field	0.2 µg/L	2 µg/L	U
diethylphthalate	Field	0.3 µg/L	3 µg/L	U
butylbenzylphthalate	Field	0.2 µg/L	2 µg/L	None - ND
cyclohexanone	Field	0.6 µg/L	3 µg/L	U

Results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and diethylphthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to the associated field blank contamination.

The result for cyclohexanone in SW-09 was qualified as less than the sample-specific contract required quantitation limit (U) due to the associated field blank contamination.

Butylbenzylphthalate was not detected in either site sample, therefore no action was warranted with respect to this target analyte.

Laboratory Fortified Blank

Recovery of pentachlorophenol (128%; QC 63-125%) was unacceptably high in the laboratory fortified blank analysis. This target analyte was not detected in either site sample, and no qualifiers were applied on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, very poor recovery was demonstrated for benzoic acid in the laboratory fortified blank analysis, based on the validator's professional judgment (9%). Results for benzoic acid in SW-04 and SW-09 were rejected (R) on this basis.



Mr. Larry McTiernan
6 August 2001
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Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson
Quality Assessment Manager

CAE/ekd

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

C:\AllTrillium\Roux SedTransport\0830SV

TABLE I
INDUSTRI-PLEX SITE
STL Connecticut Report #7001-0830A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	A ¹ , J ¹ , R ¹
SW-09	AQ	A ^{1,2} , J ¹ , R ¹

AQ - aqueous

- A¹ = Accept the results for the sample, but qualify the results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and diethylphthalate as not detected (U) at the sample-specific CRQL due to field blank contamination.
- A² = Accept the results for the sample, but qualify the result for cyclohexanone as not detected (U) at the sample-specific CRQL due to field blank contamination.
- J¹ = Estimate (UJ) the results for cyclohexanone due to a high %RSD value in the initial calibration.
- R¹ = Reject (R) the results for benzoic acid due to very poor recovery (<10%) in the associated laboratory fortified blank.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7001-0830A
Overall Evaluation of Data**

Semivolatile Organic Compounds (SVOCs)				
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability **
		Analytical Error	Sampling Error*	
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>J¹ R¹</p>	<p>Refer to qualifications in Table I</p> <p>A^{1,2}</p>	<p>1. Results for di-n-butylphthalate, bis(2-ethyl-hexyl)phthalate, diethylphthalate, and cyclohexanone were qualified as less than the sample-specific CRQLs due to blank contamination.</p> <p>2. Results for benzoic acid were rejected due to a very poor laboratory fortified blank recovery.</p> <p>3. Results for cyclohexanone were estimated (UJ) due to a high %RSD value in the initial calibration.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J = The associated numerical value is an estimated quantity.
- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS I
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7001-0830A

Sample Number Lab ID Dilution Factor* Date Sampled Date Extracted Date Analyzed	SW-04	SW-09						
	010830A-03	010830A-04						
	1.00	1.02						
	05-Apr-01	05-Apr-01						
	11-Apr-01	11-Apr-01						
	20-Apr-01	20-Apr-01						
CRQL**								
10	Cyclohexanone		UJ	10	UJ			
10	Phenol							
10	bis(2-Chloroethyl)ether							
10	2-Chlorophenol							
10	1,3-Dichlorobenzene							
10	1,4-Dichlorobenzene							
10	Benzyl alcohol							
10	1,2-Dichlorobenzene							
10	2-Methylphenol							
10	bis(2-chloroisopropyl)ether							
10	4-Methylphenol							
10	N-Nitroso-di-n-propylamine							
10	Hexachloroethane							
10	Nitrobenzene							
10	Isophorone							
10	2-Nitrophenol							
10	2,4-Dimethylphenol							
50	Benzoic acid	R		R				
10	bis(2-Chloroethoxy)methane							
10	2,4-Dichlorophenol							
10	1,2,4-Trichlorobenzene							
10	Naphthalene							

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\0830SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7001-0830A

Sample Number Lab ID Dilution Factor* Date Sampled Date Extracted Date Analyzed	SW-04	SW-09							
	010830A-03	010830A-04							
	1.00	1.02							
	05-Apr-01	05-Apr-01							
	11-Apr-01	11-Apr-01							
	20-Apr-01	20-Apr-01							
CRQL**									
10	4-Chloroaniline								
10	Hexachlorobutadiene								
10	4-Chloro-3-methylphenol								
10	2-Methylnaphthalene								
10	Hexachlorocyclopentadiene								
10	2,4,6-Trichlorophenol								
50	2,4,5-Trichlorophenol								
10	2-Chloronaphthalene								
50	2-Nitroaniline								
10	Dimethylphthalate								
10	Acenaphthylene								
10	2,6-Dinitrotoluene								
50	3-Nitroaniline								
10	Acenaphthene								
50	2,4-Dinitrophenol								
50	4-Nitrophenol								
10	Dibenzofuran								
10	2,4-Dinitrotoluene								
10	Diethylphthalate	10	U	10	U				
10	4-Chlorophenyl-phenylether								
10	Fluorene								
50	4-Nitroaniline								

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\0830SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7001-0830A

Sample Number Lab ID Dilution Factor* Date Sampled Date Extracted Date Analyzed CRQL**	SW-04	SW-09									
	010830A-03	010830A-04									
	1.00	1.02									
	05-Apr-01	05-Apr-01									
	11-Apr-01	11-Apr-01									
	20-Apr-01	20-Apr-01									
50	4,6-Dinitro-2-methylphenol										
10	N-Nitrosodiphenylamine										
10	4-Bromophenyl-phenylether										
10	Hexachlorobenzene										
50	Pentachlorophenol										
10	Phenanthrene										
10	Anthracene										
10	Di-n-butylphthalate	10 U	10 U								
10	Fluoranthene										
10	Pyrene										
10	Butylbenzylphthalate										
20	3,3'-Dichlorobenzidine										
10	Benzo(a)anthracene										
10	Chrysene										
10	bis(2-Ethylhexyl)phthalate	10 U	10 U								
10	Di-n-octylphthalate										
10	Benzo(b)fluoranthene										
10	Benzo(k)fluoranthene										
10	Benzo(a)pyrene										
10	Indeno(1,2,3-cd)pyrene										
10	Dibenz(a,h)anthracene										
10	Benzo(g,h,i)perylene										

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

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** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name STL Connecticut SOW/Method No. EPA 8270C
Case/Project No. _____ Sampling Date(s) 4/5/01
SDG No. 7001-0830A Shipping Date(s) 4/5/01
No. of Samples/Matrix _____ Date Rec'd by lab 4/6/01

Traffic Report Sample Nos. SW-01, SW-02, SW-04, SW-09, SW-10

Trip Blank No. _____
Equipment Blank No. Field Blank
Bottle Blank No. _____
Field Duplicate Nos. SW-01 / SW-10
PES Nos. _____

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation
on SW-04 and SW-09 only.

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

A - Acceptable Data
J - Numerical value associated with compound is an estimated quantity.
R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
U - Compound not detected at that numerical sample quantitation limit.
UJ - The sample quantitation limit is an estimated quantity.
TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carol Erikson Company Name Trillium, Inc. Phone Number 865 966 8880

Date Validation Started 8/4/01 Date Validation Completed _____

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	✓
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	✓
VOA/SV-III	INITIAL CALIBRATION	
VOA/SV-IV	CONTINUING CALIBRATION	✓
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NA
SV-VI	SV SURROGATE SPIKE RECOVERIES	✓
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	✓
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	✓
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	✓
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NA
VOA/SV-XV	SEMIVOLATILE CLEANUP	NA
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: Carol A. Erikson

Name: Carol A. Erikson

Date: _____

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB

COMPLETE SDG FILE (CSF) AUDIT

Organic Fractions: SVOC

Missing Information

Date Lab ContactedDate Received

raw data

acceptable to client - no action taken

Validator: ME

Date: 8/4/01

EPA-NE - Data Validation Worksheet
VOA/SV-III

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

[illegible]

Validator: CA Erikson

Date: 8/4/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Sampler: ? Company: Roux Assoc.

Contacted: Yes ☒ No ☐ Date: _____

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
4/11/01	4/19/01	SVOC/AQ	SBLKIQ	HP5971Q	di-n-butyl phthalate	0.1 µg/L
					B2EHP	0.1 µg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
4/11/01	4/20/01	SVOC/AQ	Field Blank	HP5971Q	cyclohexanone	0.6 µg/L
					DEP	0.3 µg/L
					DNBP	0.2 µg/L
					BBP	0.2 µg/L
					B2EHP	0.6 µg/L

Validator: CA Erikson

Date: 8/4/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-B

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
DNBP	Field	4/5/01	0.2 µg/L	2 µg/L	10	SW-04, -09	U @ CRQL
BaEHP	Field	4/5/01	0.6 µg/L	6 µg/L	10	SW-04, -09	U @ CRQL
DEP	↓	↓	0.3 µg/L	3 µg/L	↓	SW-04, -09	U @ CRQL
BBP	↓	↓	0.2 µg/L	2 µg/L	↓	none (no hits)	none
cyclohexanone	↓	↓	0.6 µg/L	5.3 µg/L	↓	SW-09	U @ CRQL

Comments: _____

Validator: CA Smith

Date: 8/4/01

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? ☒ Y N
- Does it contain all target compounds at the method-required QLs? @ 40 µg/L or 120 µg/L (very acid) Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can't tell Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
SBLKIO					
AQ	benzoic acid	97% (60-2570) ... PJ		SW-04, -09	UJ-R
	PCP	1287% (63-12570)		SW-04, -09	None

Validator: ca Erikson

Date: 8/4/01

Spring Storm 2B



TRILLIUM INC.
Consultants in Environmental Chemistry

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cerikson@trilliuminc.com

August 6, 2001

Mr. Larry McTiernan
Roux Associates, Inc.
25 Corporate Drive
Suite 230
Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-1290A
Downgradient Transport (Surface Water and Sediments) Investigation
Industri-Plex Site
Woburn, Massachusetts
SVOCs: 9/Surface Waters/SW-01, SW-02, SW-03, SW-04, SW-05, SW-07,
SW-08, SW-09, SW-10
(Field Duplicates: SW-01/SW-10)

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * • Preservation and Technical Holding Times.
- NA • Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- * • Initial and Continuing Calibration.

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Mr. Larry McTiernan
6 August 2001
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- Blanks.
 - * • Surrogate Compounds.
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 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
 - NA • PE Samples/Accuracy Check.
 - NA • Target Compound Identification.
 - NA • Sample Quantitation and Reported Quantitation Limits.
 - NA • SVOC and Pesticides Cleanup.
 - NA • System Performance.
- * = All criteria were met for this parameter.
NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

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SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes method blank contamination and poor laboratory fortified blank performance. There was one major impact on data usability:

- Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated method blank.

Mr. Larry McTiernan
6 August 2001
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STL Connecticut Report #7001-1290A

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compounds were reported in the associated method blank:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Method	2 µg/L	20 µg/L	U

Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to the associated blank contamination.

No field blank was submitted to the laboratory with this data set.

Laboratory Fortified Blank

Recovery of 2,4,5-trichlorophenol (62%; QC 71-124%) was unacceptably low in the laboratory fortified blank analysis. Results for 2,4,5-trichlorophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, very poor recovery was demonstrated for benzoic acid in the laboratory fortified blank analysis, based on the validator's professional judgment (9%). The very low concentration positive results reported for benzoic acid in SW-04 and SW-09 were qualified as estimated (J) on this basis.



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Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson
Quality Assessment Manager

CAE/ekd

Attachments: Table I: Recommendation Summary
Table II: Overall Evaluation of Data
Data Summary Key
Data Validation (DV) Worksheet
Data Summary Table

C:\AllTrillium\Roux SedTransport\1290SV

TABLE I
INDUSTRI-PLEX SITE
STL Connecticut Report #7001-1290A
Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	A ¹ , J ¹
SW-09	AQ	A ¹ , J ¹

AQ - aqueous

- A¹ = Accept the results for the sample, but qualify the results for bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL due to blank contamination.
- J¹ = Estimate (J, UJ) the results for benzoic acid and 2,4,5-trichlorophenol due to unacceptably low recoveries in the laboratory fortified blank analysis.

TABLE II

**INDUSTRI-PLEX SITE
STL REPORT #7001-1290A
Overall Evaluation of Data**

Semivolatile Organic Compounds (SVOCs)				
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability **
		Analytical Error	Sampling Error*	
<p>The DQO for this site is to collect data of sufficient quality to:</p> <ol style="list-style-type: none"> 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project. 	<p><i>Analytical Method:</i></p> <p>Yes SW-846 Method 8270C</p> <p><i>Sampling Method:</i></p> <p>Yes Grab</p>	<p>Refer to qualifications in Table I</p> <p>A¹ J¹</p>		<p>1. Results for bis(2-ethylhexyl)phthalate were qualified as less than the sample-specific CRQLs due to blank contamination.</p> <p>2. Results for benzoic acid and 2,4,5-trichlorophenol were estimated (J, UJ) due to unacceptably low laboratory fortified blank recoveries.</p>

* The evaluation of "sampling error" cannot be completely assessed in data validation.

** Sampling variability is not assessed in data validation.

**DATA SUMMARY KEY
ORGANIC DATA VALIDATION**

- J** = The associated numerical value is an estimated quantity.
- R** = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U** = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ** = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS I
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7001-1290A

Sample Number	SW-04	SW-09
Lab ID	011290A-04	011290A-08
Dilution Factor*	1.00	1.18
Date Sampled	24-May-01	24-May-01
Date Extracted	30-May-01	30-May-01
Date Analyzed	6-Jun-01	6-Jun-01
CRQL**		
10 Cyclohexanone		35
10 Phenol		
10 bis(2-Chloroethyl)ether		
10 2-Chlorophenol		
10 1,3-Dichlorobenzene		
10 1,4-Dichlorobenzene		
10 Benzyl alcohol		
10 1,2-Dichlorobenzene		
10 2-Methylphenol		
10 bis(2-chloroisopropyl)ether		
10 4-Methylphenol		
10 N-Nitroso-di-n-propylamine		
10 Hexachloroethane		
10 Nitrobenzene		
10 Isophorone		
10 2-Nitrophenol		
10 2,4-Dimethylphenol		
50 Benzoic acid	1 J	0.9 J
10 bis(2-Chloroethoxy)methane		
10 2,4-Dichlorophenol		
10 1,2,4-Trichlorobenzene		
10 Naphthalene		

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\1290SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7001-1290A

Sample Number		SW-04	SW-09
Lab ID		011290A-04	011290A-08
Dilution Factor*		1.00	1.18
Date Sampled		24-May-01	24-May-01
Date Extracted		30-May-01	30-May-01
Date Analyzed		6-Jun-01	6-Jun-01
CRQL**			
10	4-Chloroaniline		
10	Hexachlorobutadiene		
10	4-Chloro-3-methylphenol		
10	2-Methylnaphthalene		
10	Hexachlorocyclopentadiene		
10	2,4,6-Trichlorophenol		
50	2,4,5-Trichlorophenol	UJ	UJ
10	2-Chloronaphthalene		
50	2-Nitroaniline		
10	Dimethylphthalate		
10	Acenaphthylene		
10	2,6-Dinitrotoluene		
50	3-Nitroaniline		
10	Acenaphthene		
50	2,4-Dinitrophenol		
50	4-Nitrophenol		
10	Dibenzofuran		
10	2,4-Dinitrotoluene		
10	Diethylphthalate	0.1 J	0.3 J
10	4-Chlorophenyl-phenylether		
10	Fluorene		
50	4-Nitroaniline		

* includes adjustment for use of a sample volume slightly smaller than 1000 ml.

\Roux SedTransport\1290SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3
WATER SAMPLES
(ug/L)

Site Name: Industri-Plex

STL Report #7001-1290A

Sample Number	SW-04	SW-09			
Lab ID	011290A-04	011290A-08			
Dilution Factor*	1.00	1.18			
Date Sampled	24-May-01	24-May-01			
Date Extracted	30-May-01	30-May-01			
Date Analyzed	6-Jun-01	6-Jun-01			
CRQL**					
50	4,6-Dinitro-2-methylphenol				
10	N-Nitrosodiphenylamine				
10	4-Bromophenyl-phenylether				
10	Hexachlorobenzene				
50	Pentachlorophenol				
10	Phenanthrene				
10	Anthracene				
10	Di-n-butylphthalate	0.2 J	0.2 J		
10	Fluoranthene		0.2 J		
10	Pyrene		0.2 J		
10	Butylbenzylphthalate				
20	3,3'-Dichlorobenzidine				
10	Benzo(a)anthracene				
10	Chrysene				
10	bis(2-Ethylhexyl)phthalate	10 U	12 U		
10	Di-n-octylphthalate				
10	Benzo(b)fluoranthene				
10	Benzo(k)fluoranthene				
10	Benzo(a)pyrene				
10	Indeno(1,2,3-cd)pyrene				
10	Dibenz(a,h)anthracene				
10	Benzo(g,h,i)perylene				

* includes adjustment for use of a sample volume slightly smaller than 1000 mL

\\Roux SedTransport\1290SV

** blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name SL Connecticut SOW/Method No. EPA 8270C
Case/Project No. _____ Sampling Date(s) 5/24/01
SDG No. 7001-1290A Shipping Date(s) 5/24/01
No. of Samples/Matrix _____ Date Rec'd by lab 5/25/01
Traffic Report Sample Nos. SW-01, SW-02, SW-03, SW-04, SW-05,
SW-07, SW-08, SW-09, SW-10
Trip Blank No. _____
Equipment Blank No. _____
Bottle Blank No. _____
Field Duplicate Nos. SW-01/SW-10
PES Nos. _____

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision 12/96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial-Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation

SW-04 and SW-09 only

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

A - Acceptable Data

J - Numerical value associated with compound is an estimated quantity.

R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.

U - Compound not detected at that numerical sample quantitation limit.

UJ - The sample quantitation limit is an estimated quantity.

TB, BB, EB - Compound detected in aqueous trip blank, aqueous bottle blank, or aqueous equipment blank associated with soil/sediment samples.

Validator's Name Carol A. Euker Company Name Trillium, Inc. Phone Number 865 966 8880

Date Validation Started 8/4/01 Date Validation Completed 8/6/01

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	<input checked="" type="checkbox"/>
VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	<input checked="" type="checkbox"/>
VOA/SV-III	INITIAL CALIBRATION	<input checked="" type="checkbox"/>
VOA/SV-IV	CONTINUING CALIBRATION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NA
SV-VI	SV SURROGATE SPIKE RECOVERIES	<input checked="" type="checkbox"/>
VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	<input checked="" type="checkbox"/>
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA
VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA
VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NA
VOA/SV-XV	SEMIVOLATILE CLEANUP	NA
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

Pest/PCB worksheets:

VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION	
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION	
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
Pest/PCB-VI	SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT	
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	<input checked="" type="checkbox"/>

I certify that all criteria were met for the worksheets checked above.

Signature: Carol A. Erikson

Name: Carol A. Erikson

Date: _____

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB

COMPLETE SDG FILE (CSF) AUDIT

Organic Fractions: SVOC

Missing Information

Date Lab Contacted

Date Received

raw data

acceptable to client - no action taken

Validator: PA Erikson

Date: 8/4/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Sampler: _____ Company: Roux

Contacted: Yes No Date: _____

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
5/30/01	6/4/01	SVOC/AQ	SBLKSG/MB	HP5971Q	B2EHP	2 µg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)

None included

Validator: CAE

Date: 8/6/01

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-X

X. SENSITIVITY CHECK (Method Detection Limit Study)

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

- Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest? Y N
- Date of Preparation/Analysis: _____ Within 1 year? Y N
- Instrument I.D.: _____ Same as samples? Y N
- Column I.D.: _____ Same as samples? Y N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

- Has an appropriate and complete LFB been submitted at the proper frequency? Y N
- Does it contain all target compounds at the method-required QLs? @ 40ug/L or 120ug/L (benzoic acid) Y N
- Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can't tell Y N

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
SBLKSO					
SVOC	Benzoic acid	99% (QC 0-25%)		SW-04, -09	J (low @ both SPLS)
	245 TCP	62% (QC 71-124%)		SW-04, -09	UJ

Validator: CAE

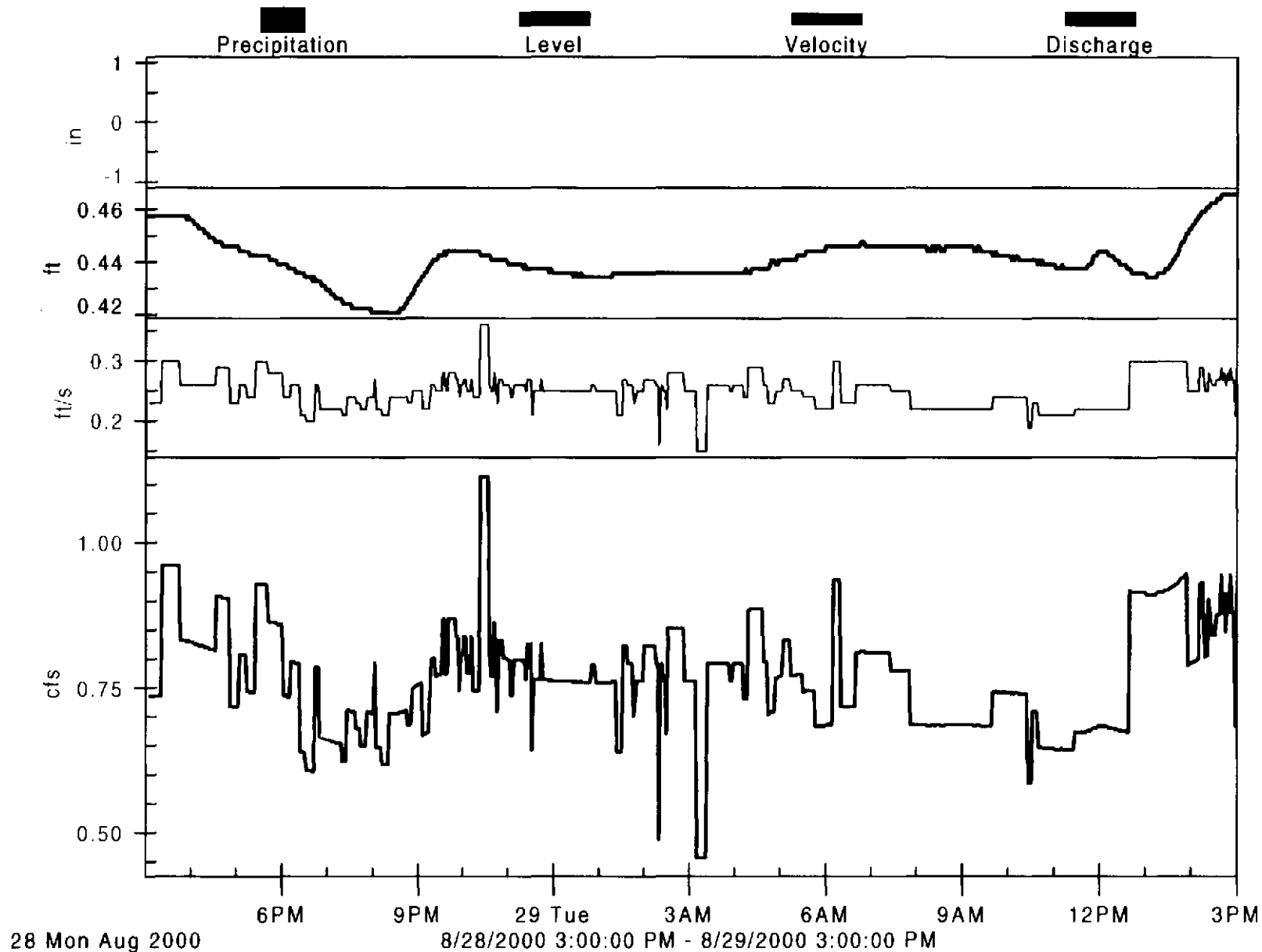
Date: 8/6/01

APPENDIX H

Hydrographs

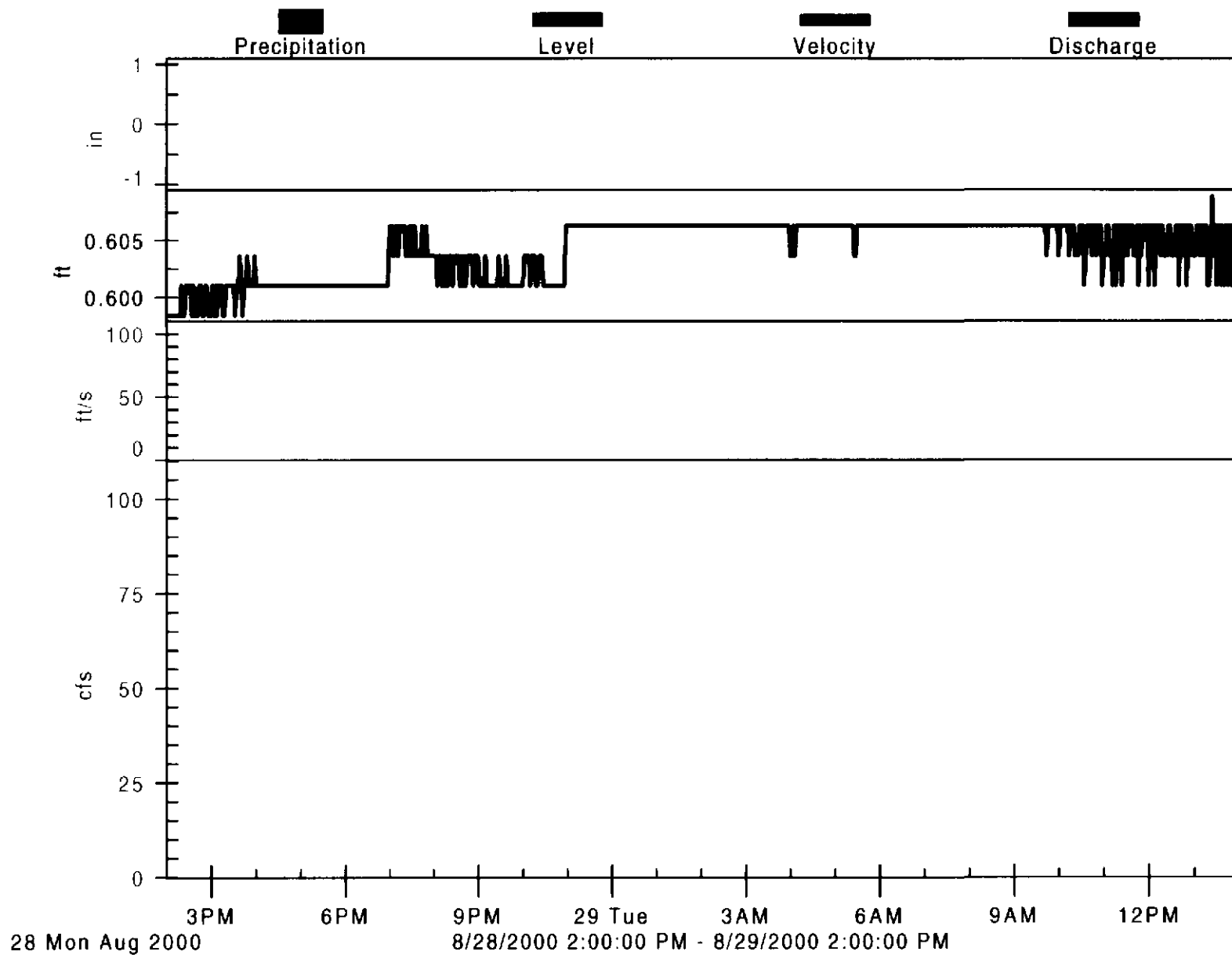
Summer Baseflow

SW-1 Summer Baseflow



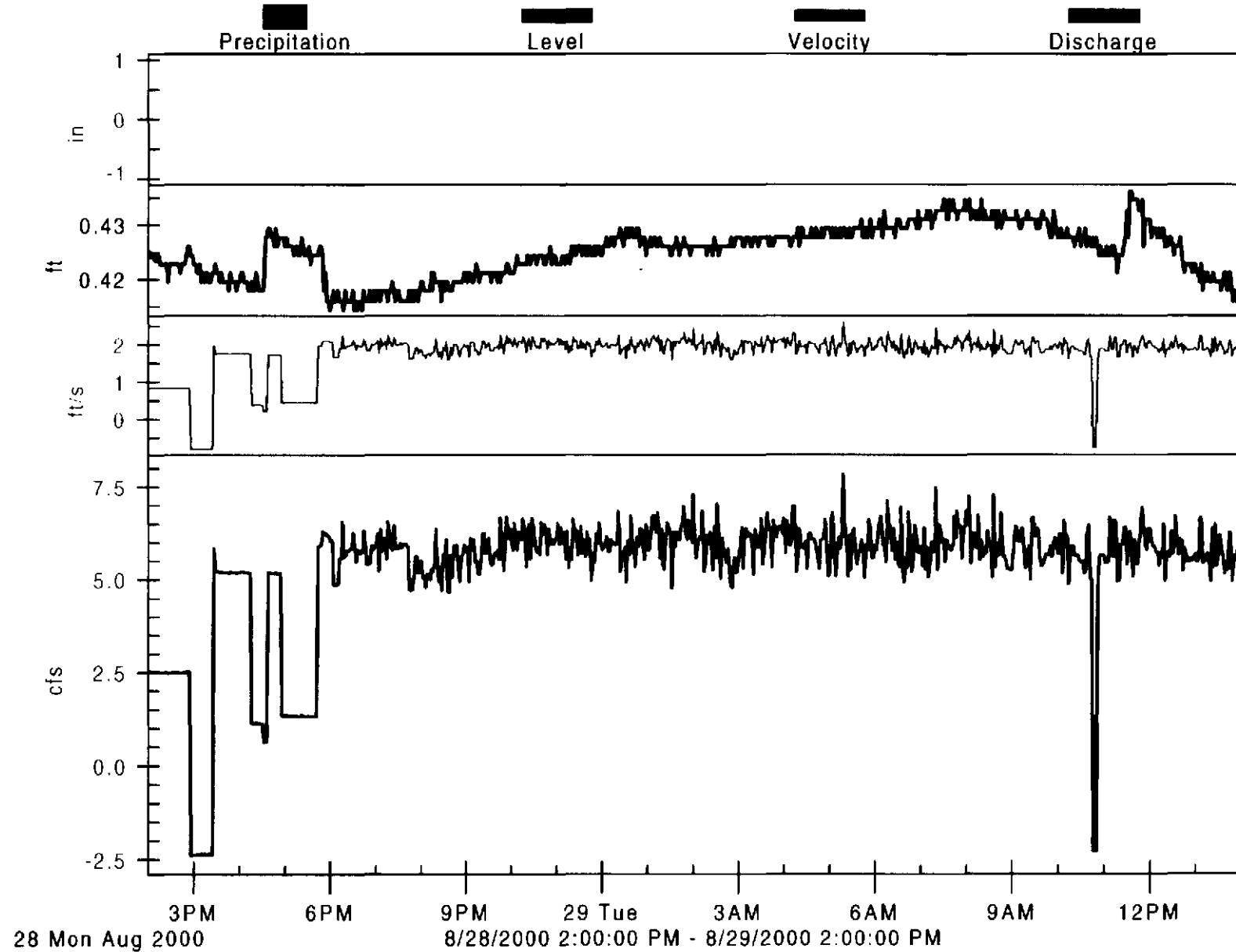
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SW-4 Summer Baseflow



Original includes color coding.

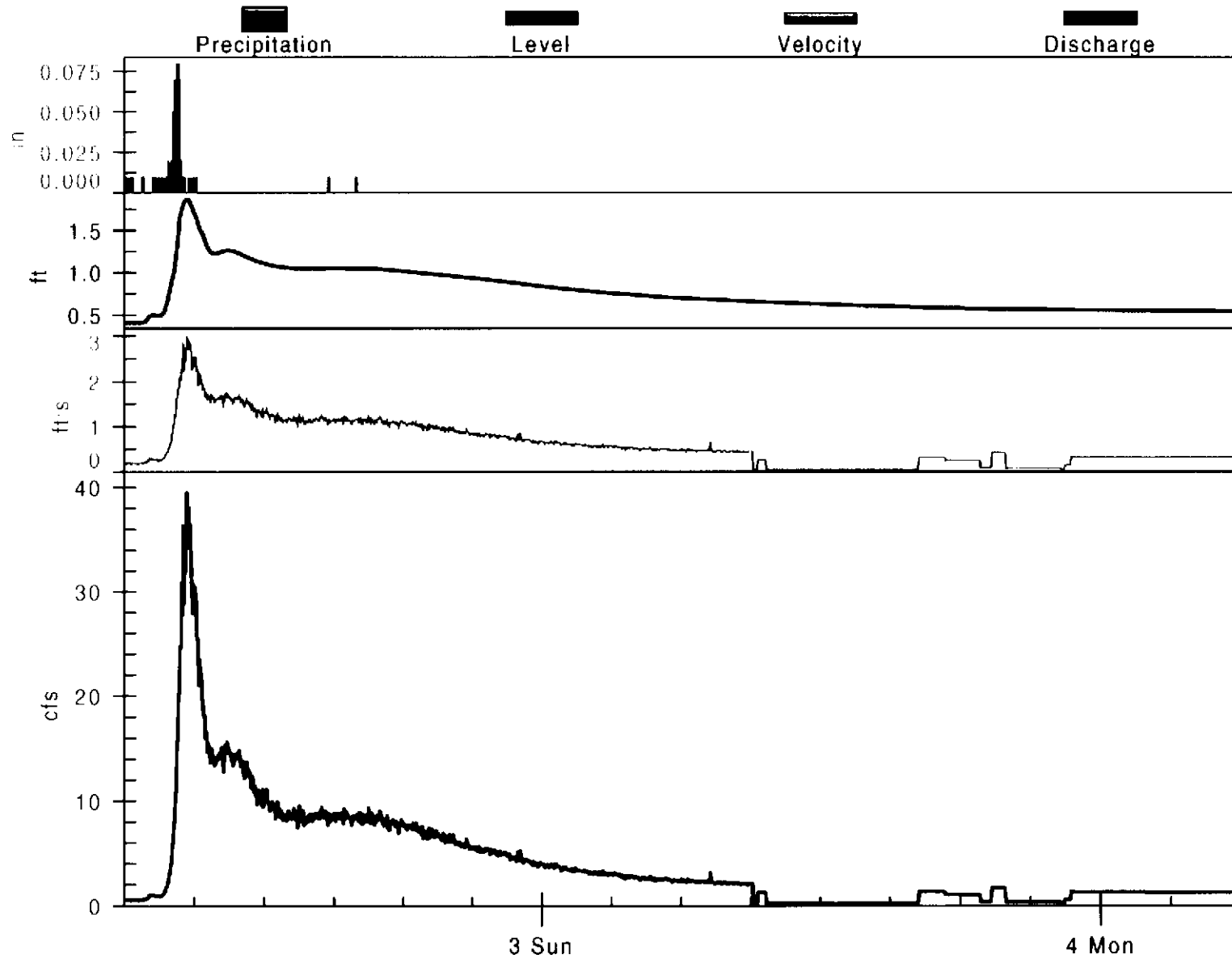
SW-9 Summer Baseflow



Original includes color coding.

Summer Storm 1

SW-1 Summer Storm 1

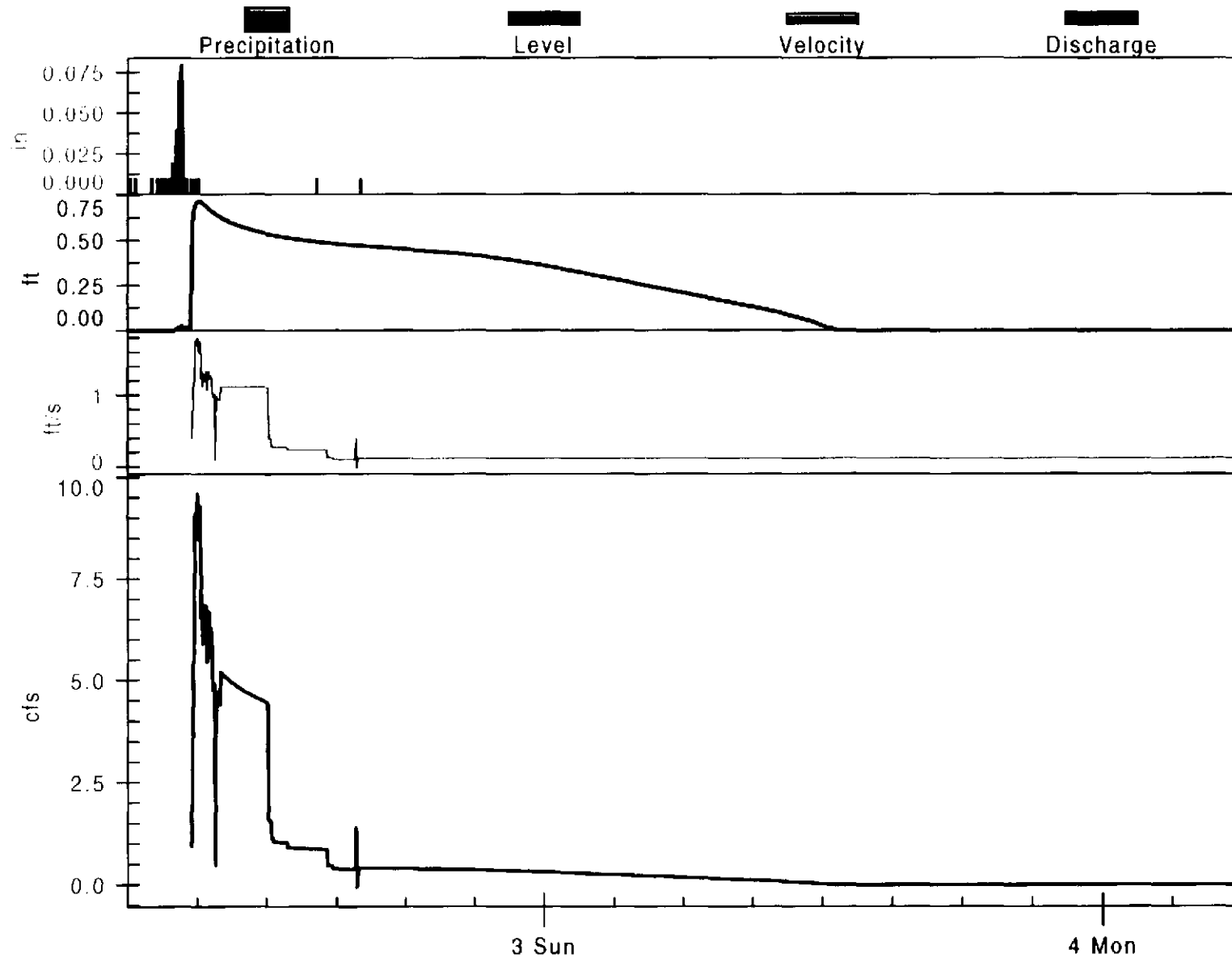


Sep 2000

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Original includes color coding.

SW-2 Summer Storm 1



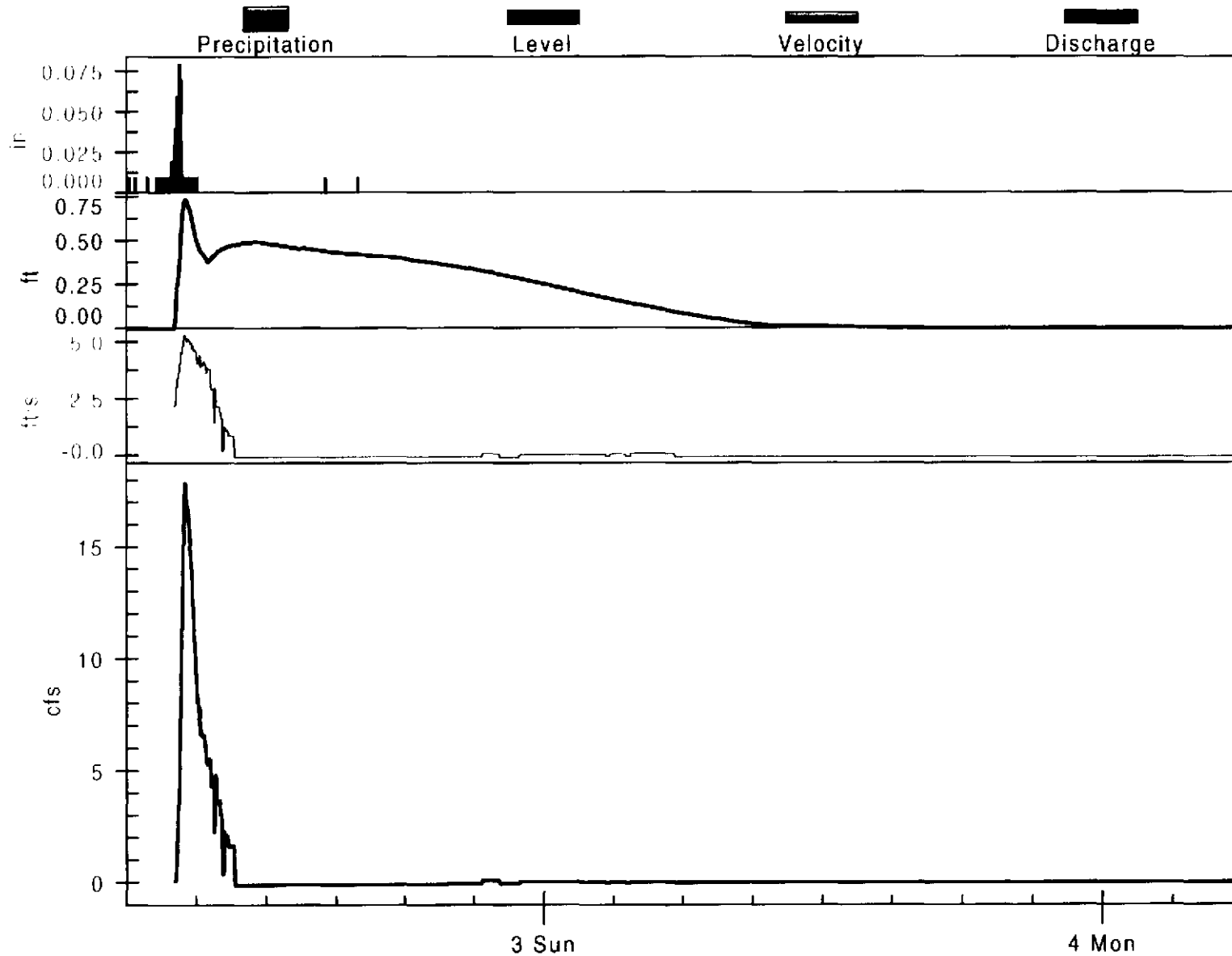
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3 Sun
9/2/2000 6:00:00 AM - 9/4/2000 6:00:00 AM

4 Mon

Original includes color coding.

SW-3 Summer Storm 1

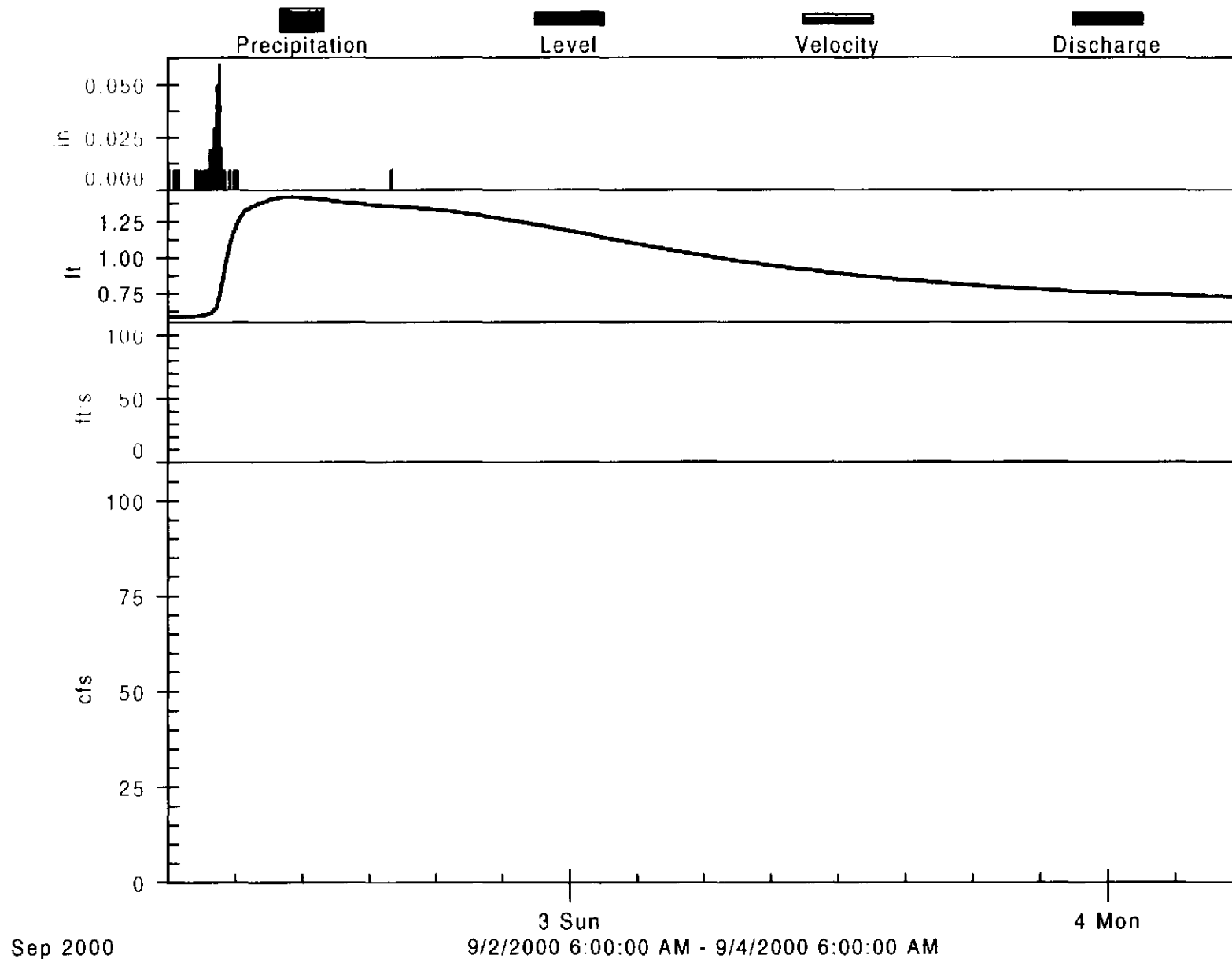


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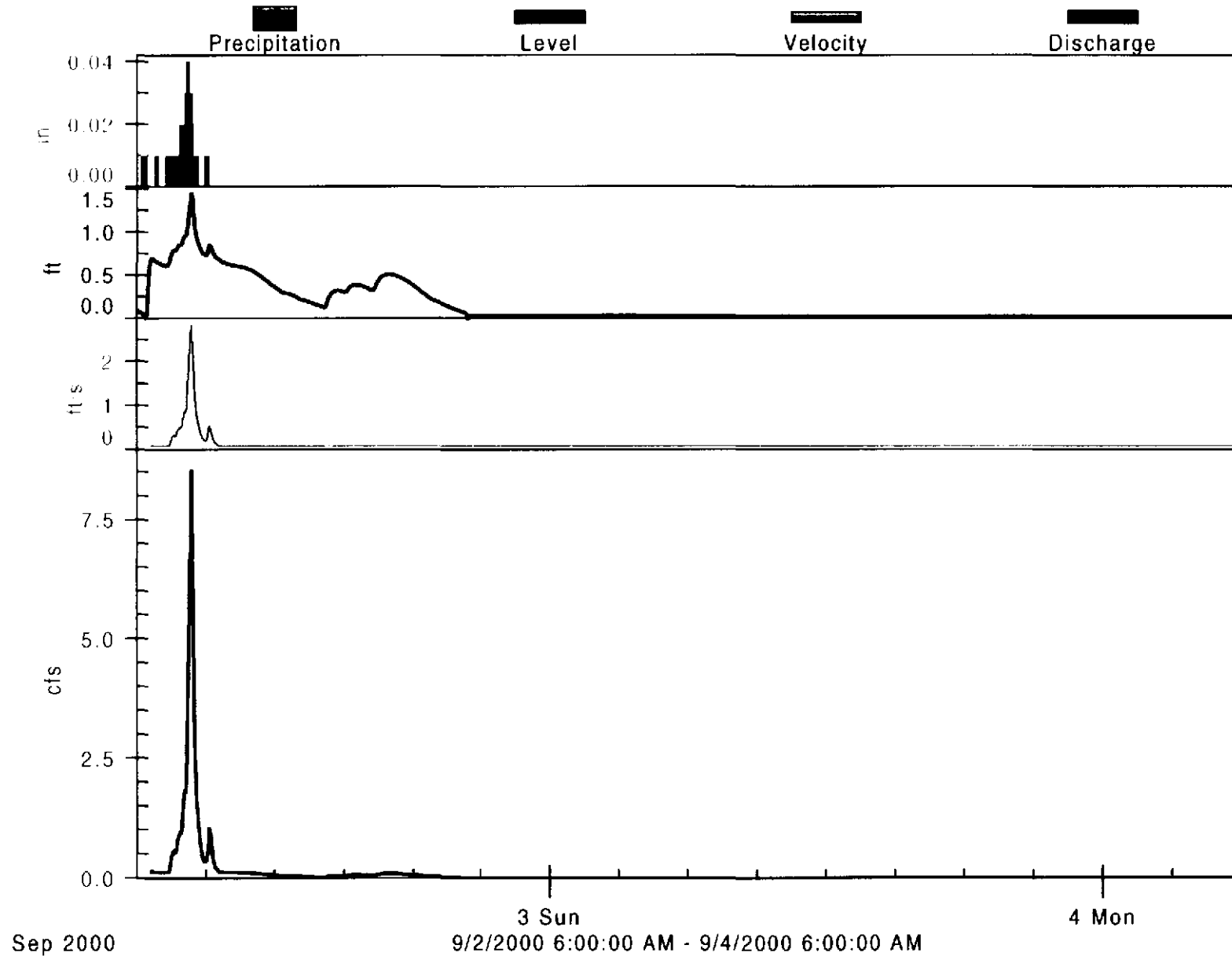
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SW-4 Summer Storm 1



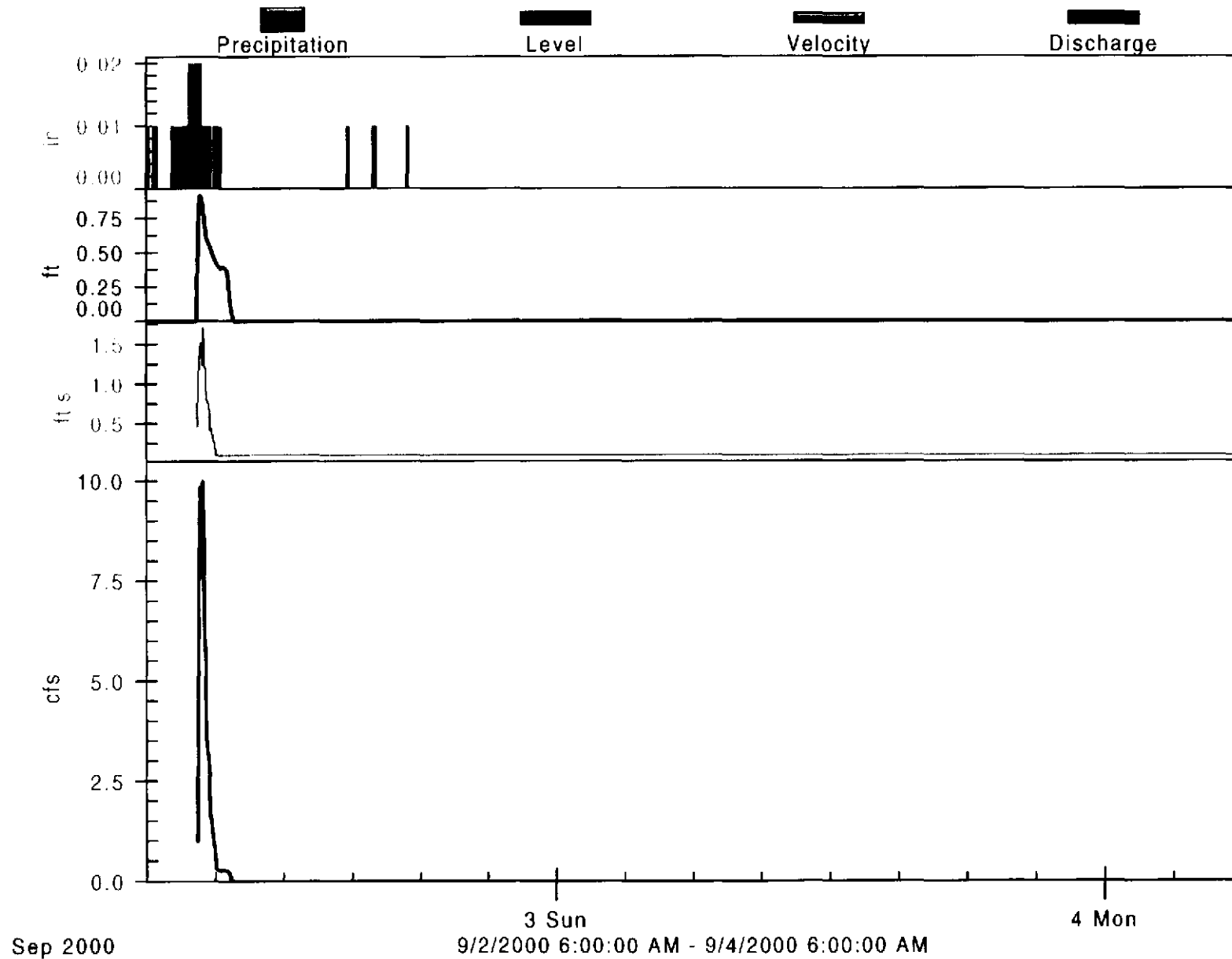
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SW-5 Summer Storm 1



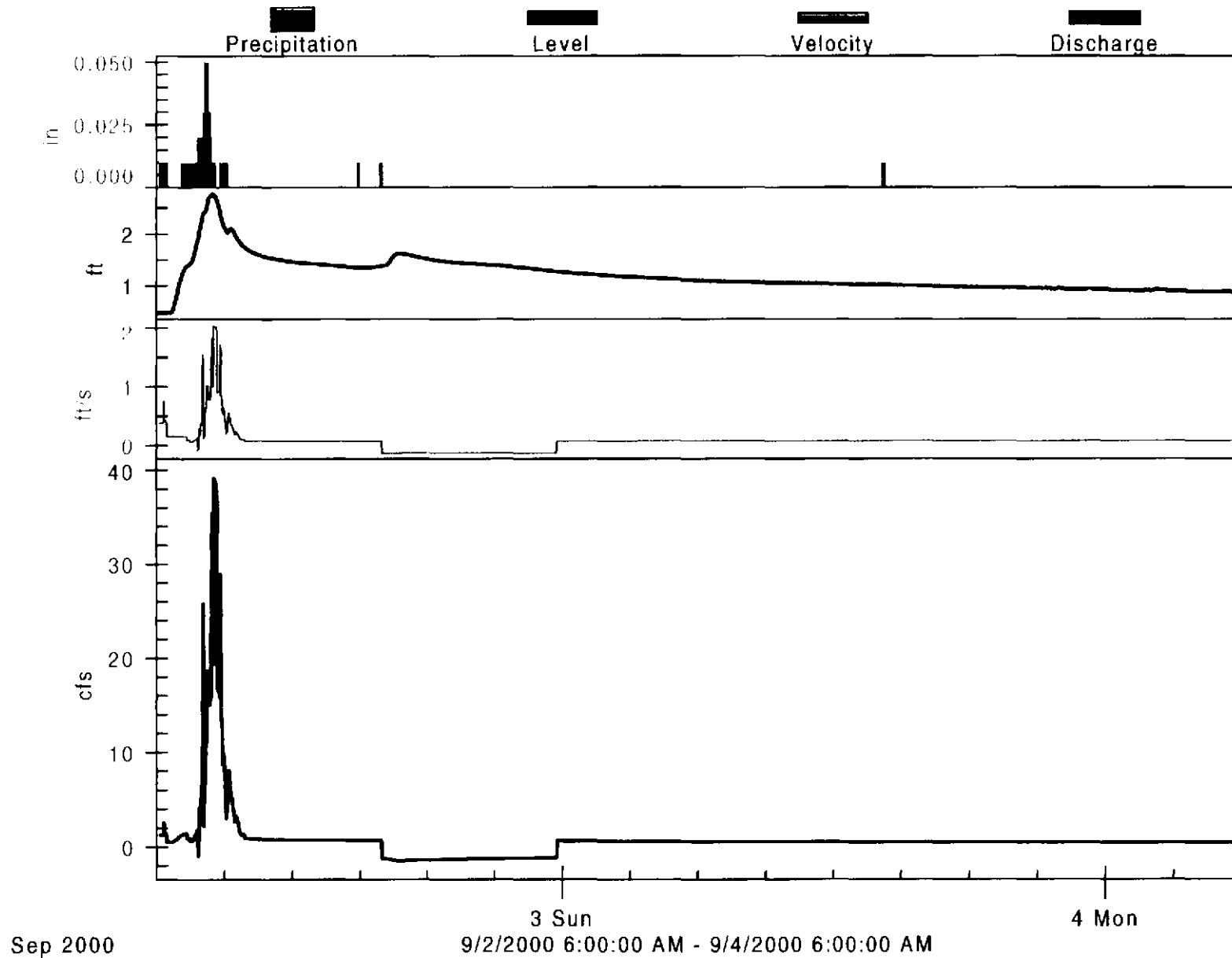
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SW-6 Summer Storm 1



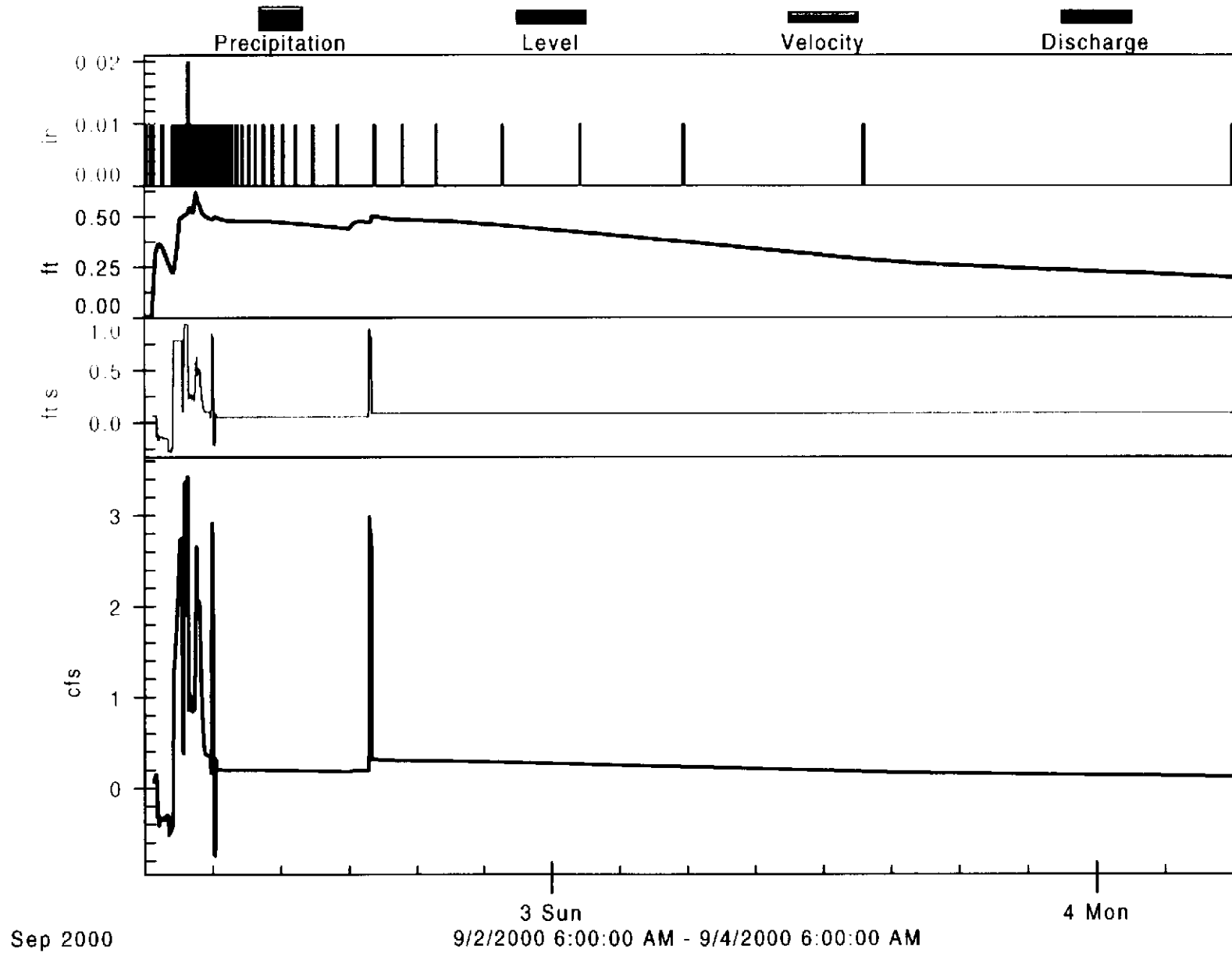
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SW-7 Summer Storm 1



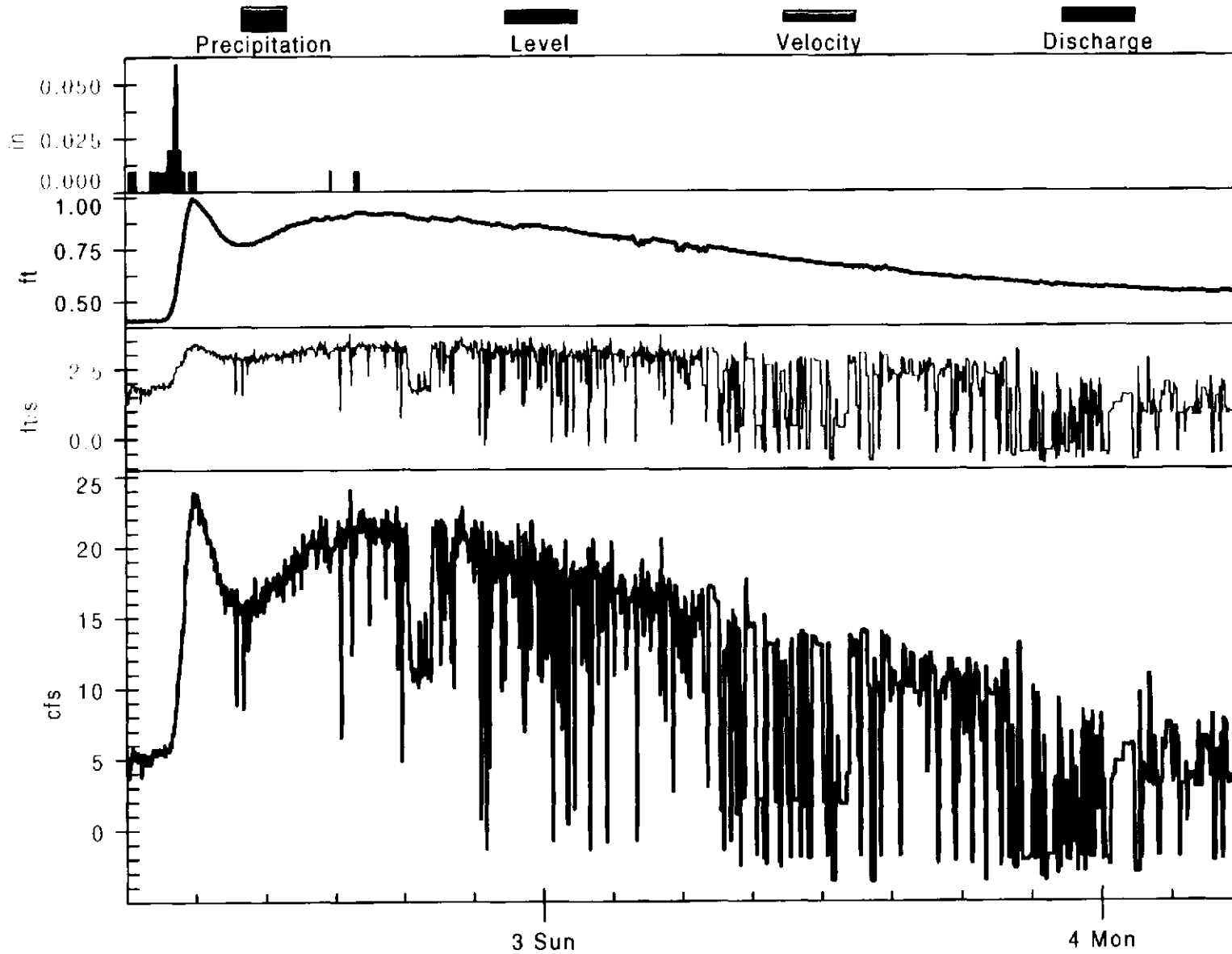
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SW-8 Summer Storm 1



Original includes color coding.

SW-9 Summer Storm 1



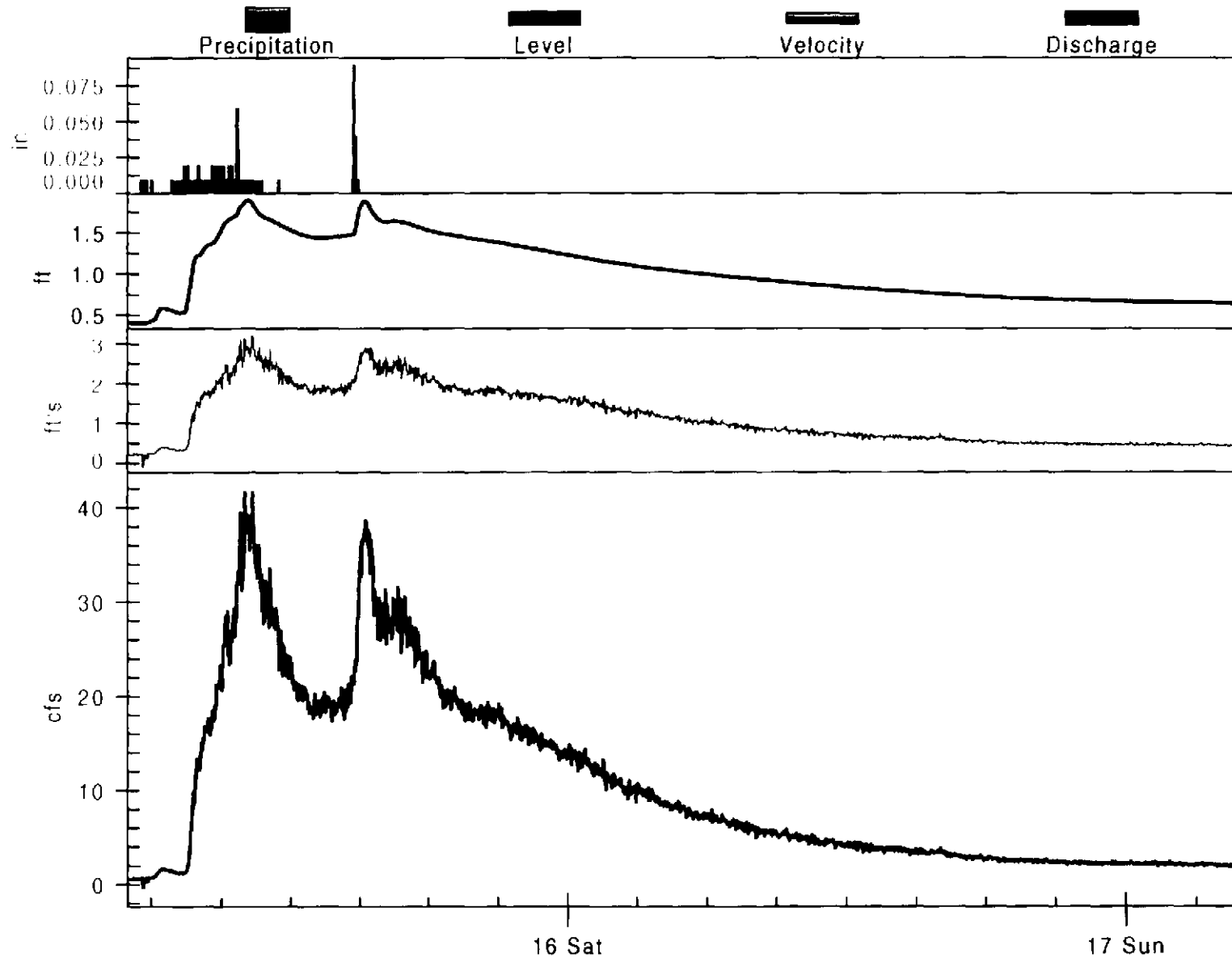
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Original includes color coding.

Summer Storm 2

SW-1 Summer Storm 2



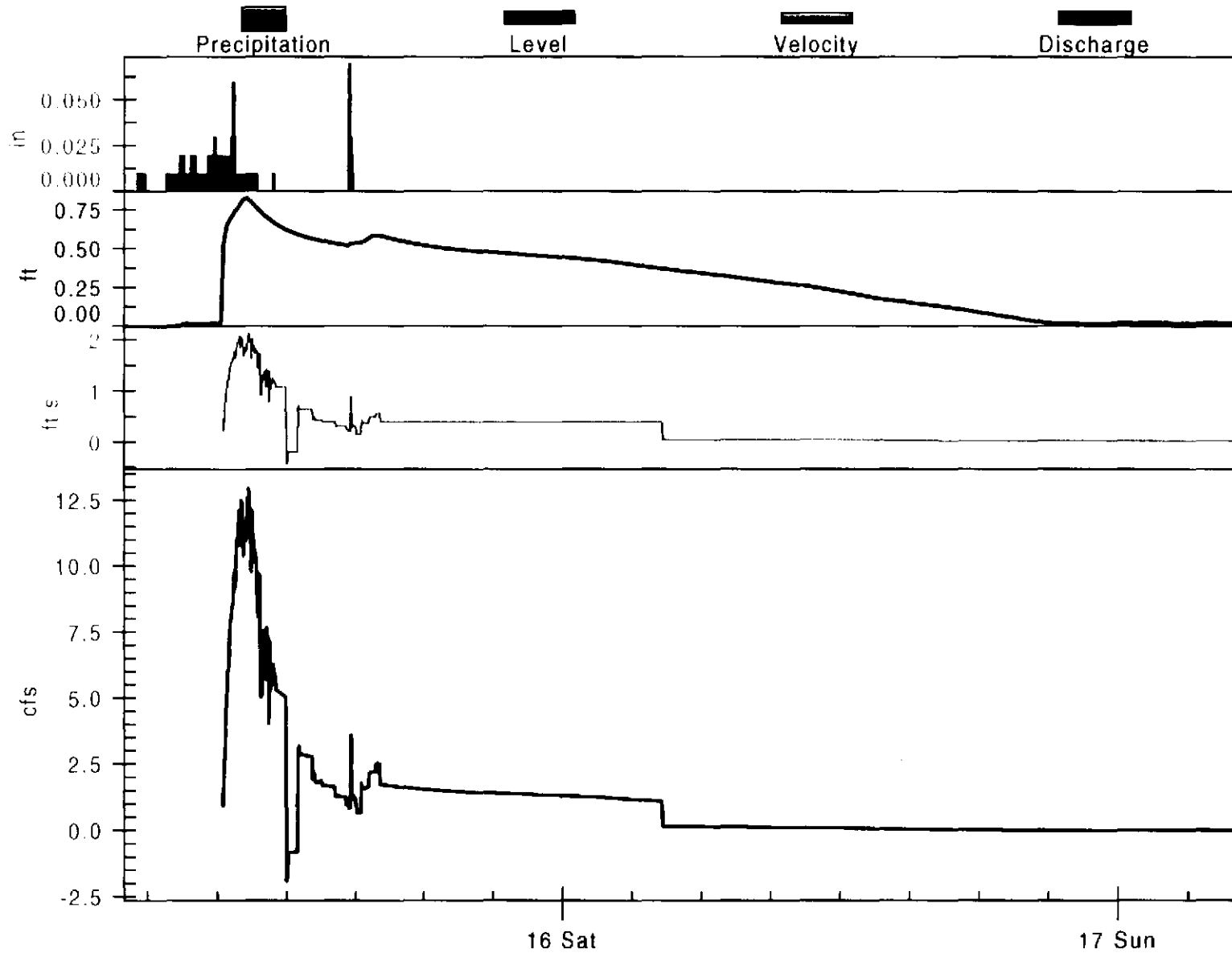
Sep 2000

16 Sat
9/15/2000 5:00:00 AM - 9/17/2000 5:00:00 AM

17 Sun

Original includes color coding.

SW-2 Summer Storm 2

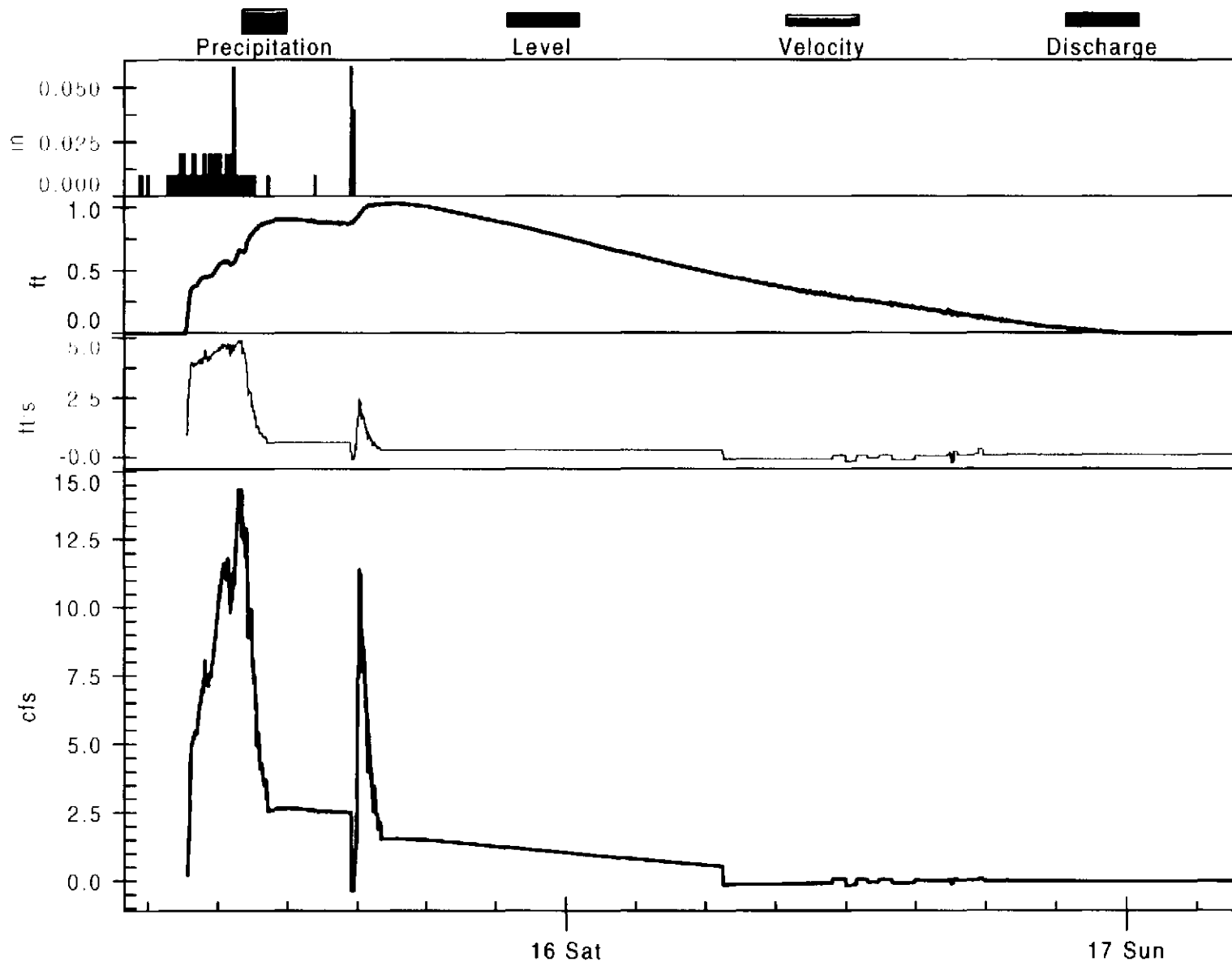


Sep 2000

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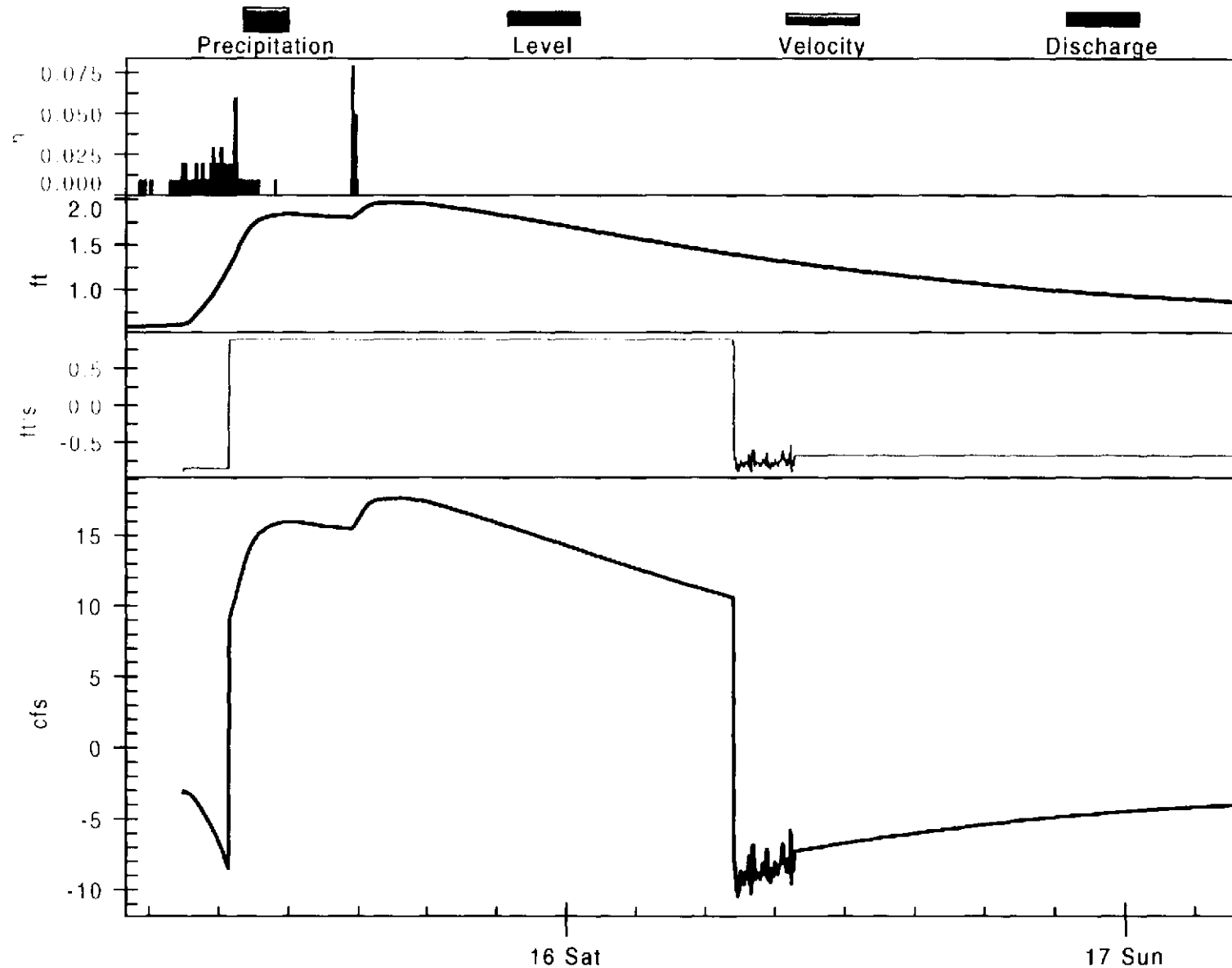


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SW-4 Summer Storm 2

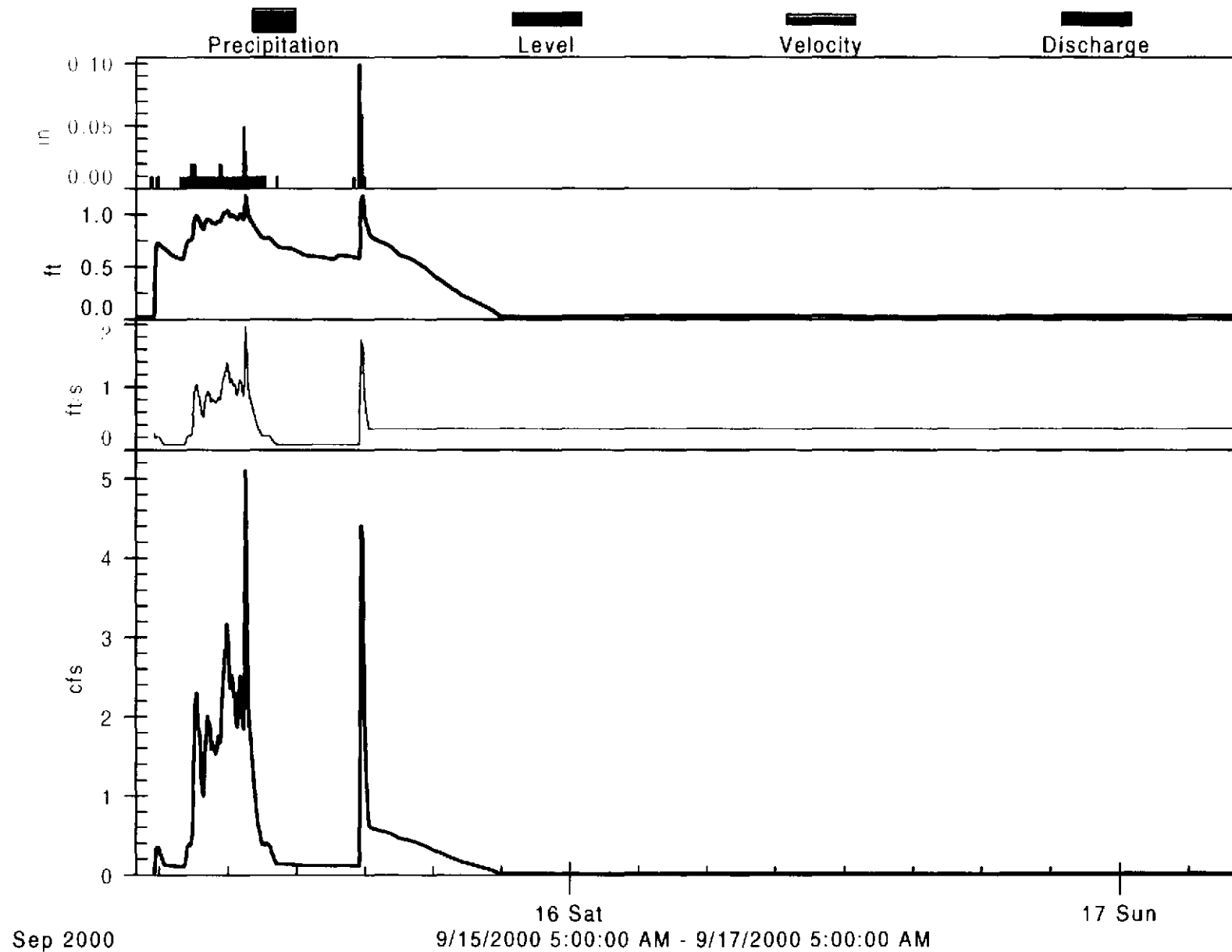


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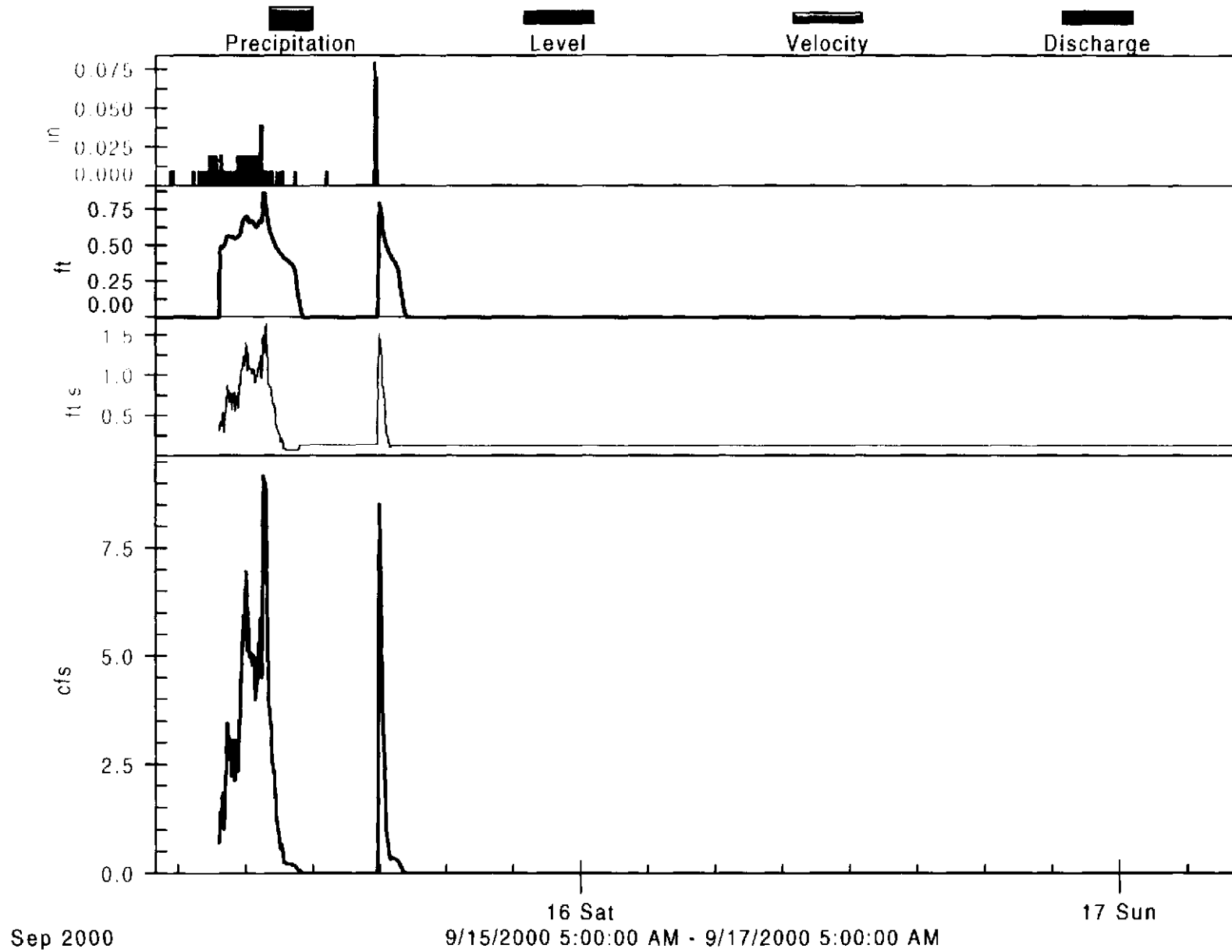
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SW-5 Summer Storm 2



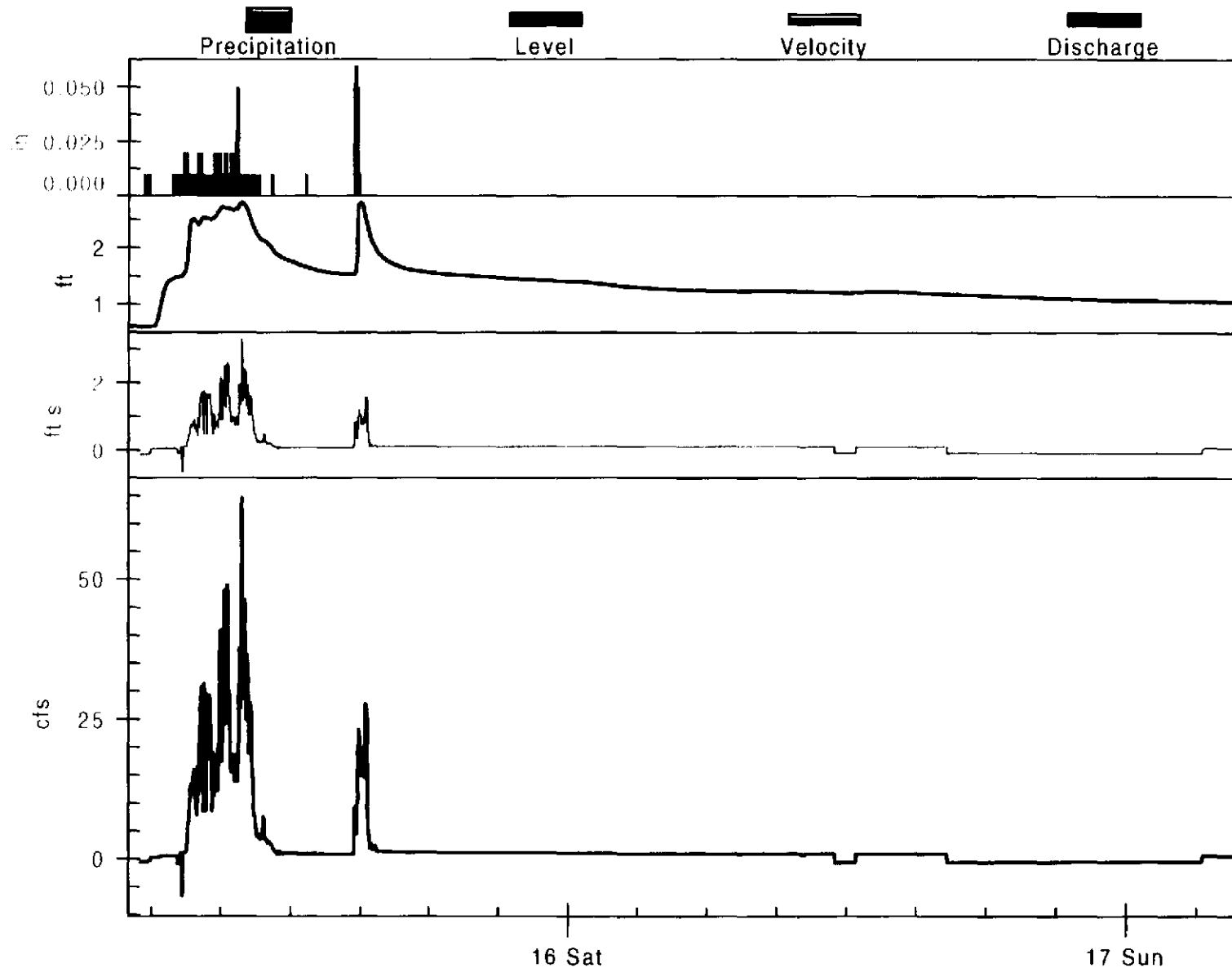
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SW-6 Summer Storm 2



Original includes color coding.

SW-7 Summer Storm 2



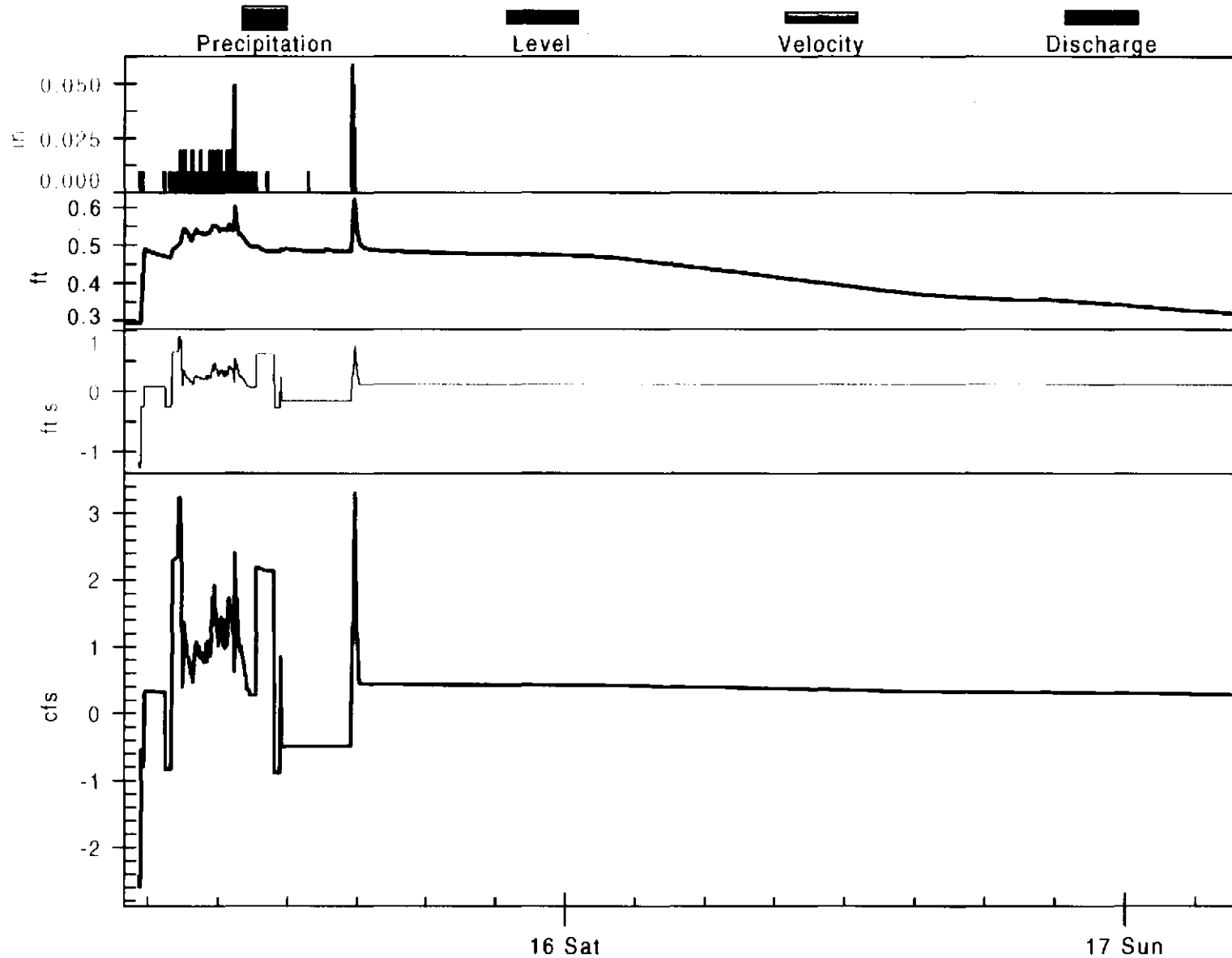
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9/15/2000 5:00:00 AM - 9/17/2000 5:00:00 AM

17 Sun

Original includes color coding.

SW-8 Summer Storm 2



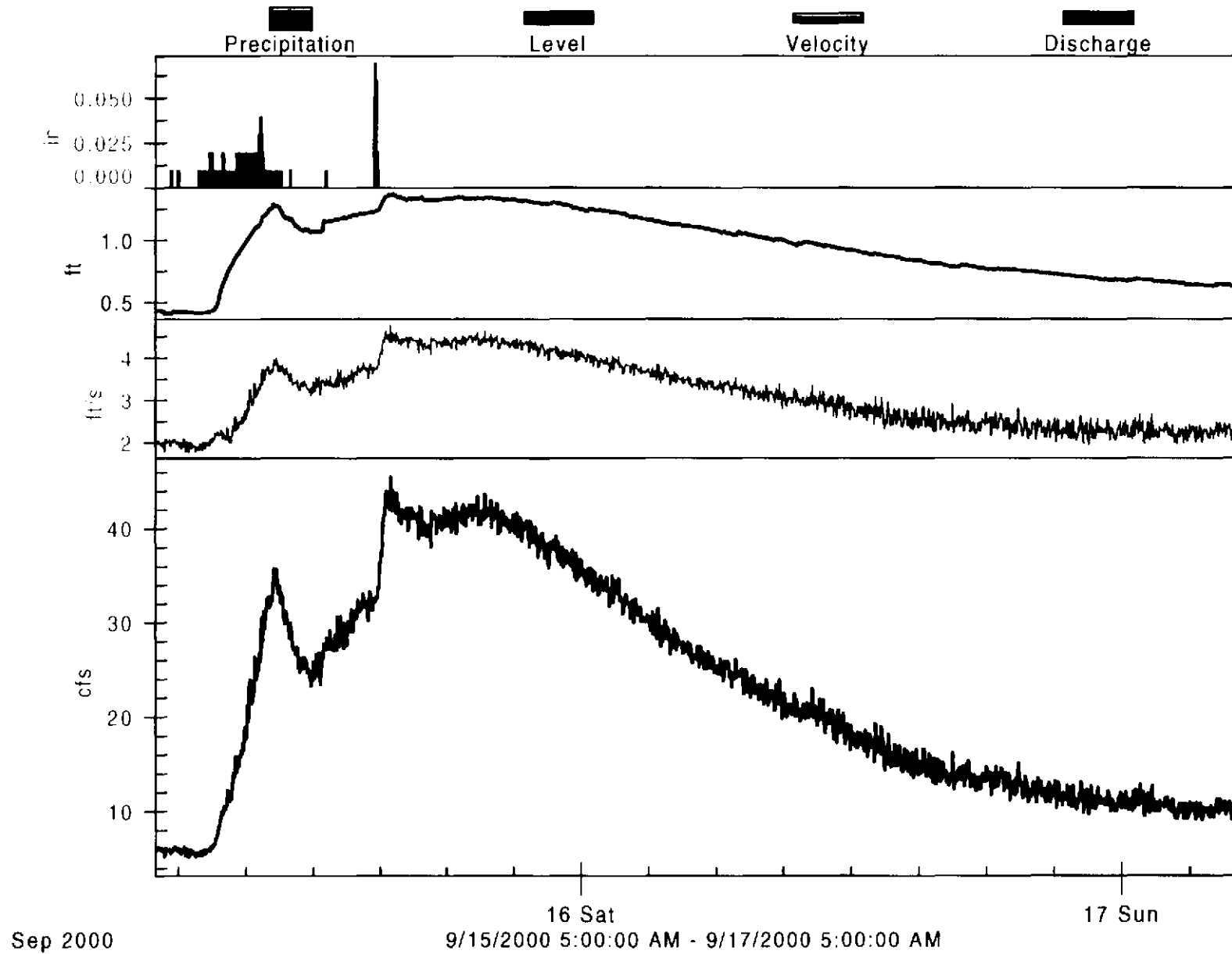
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9/15/2000 5:00:00 AM - 9/17/2000 5:00:00 AM

17 Sun

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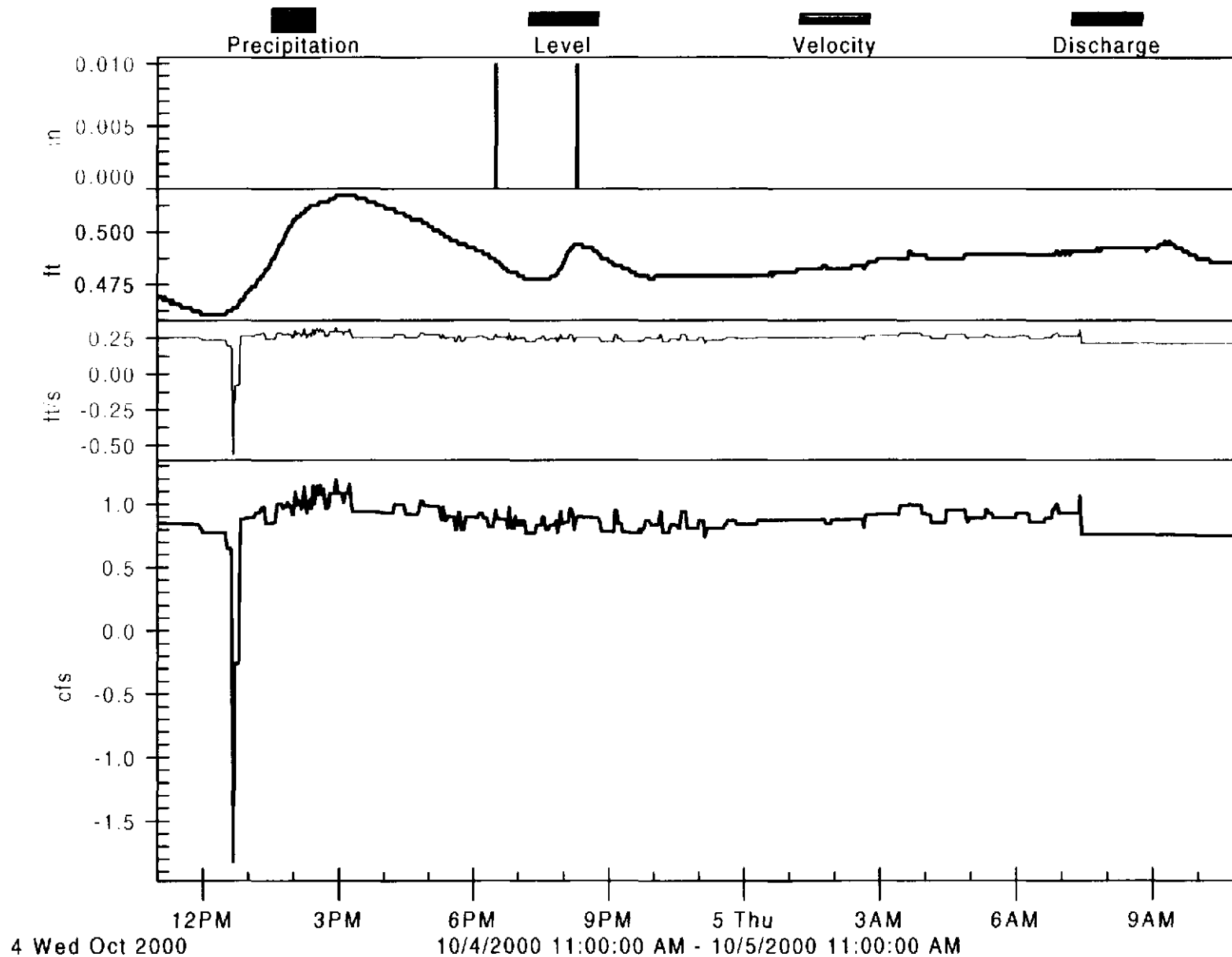
SW-9 Summer Storm 2



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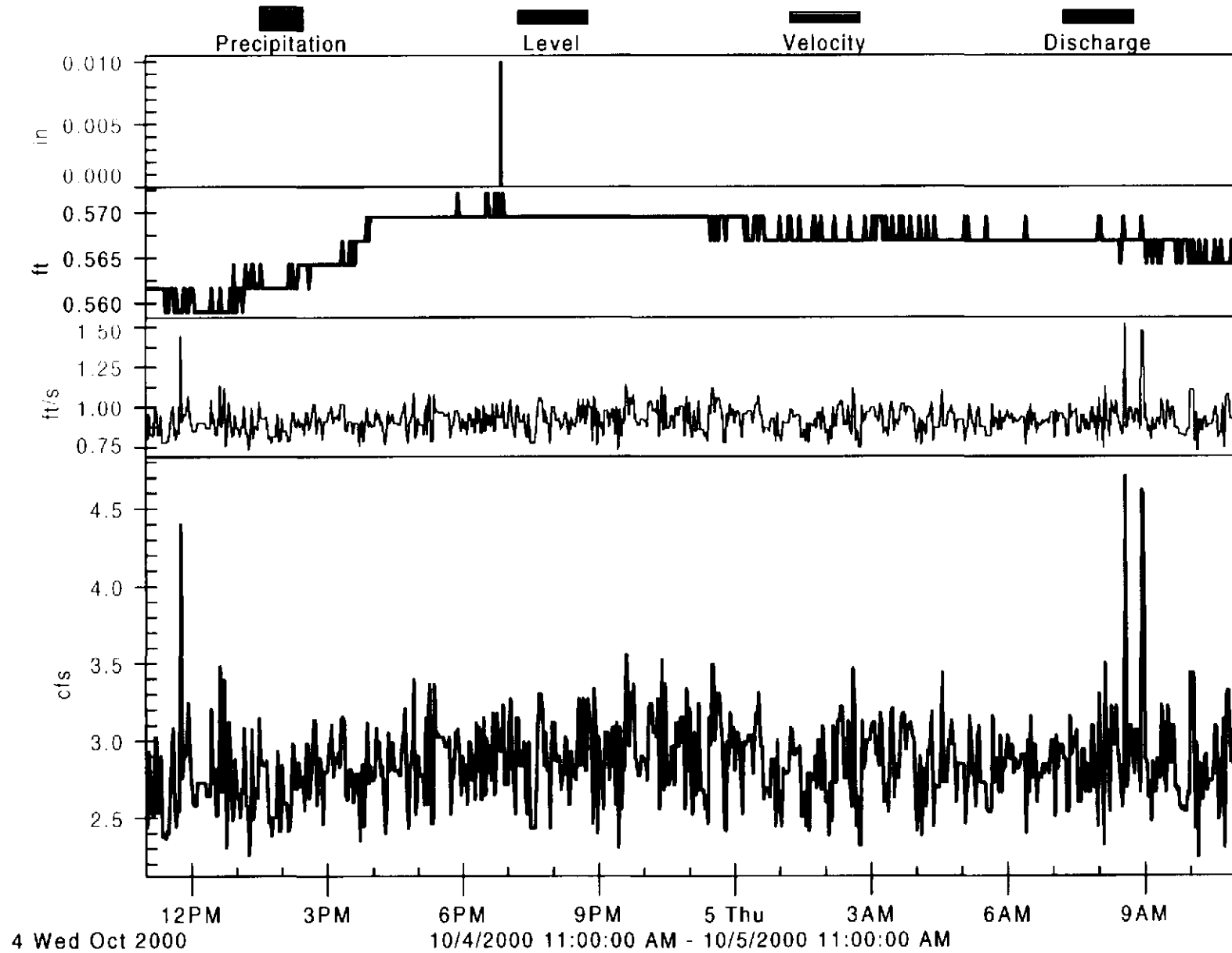
Fall Baseflow

SW-1 Fall Baseflow



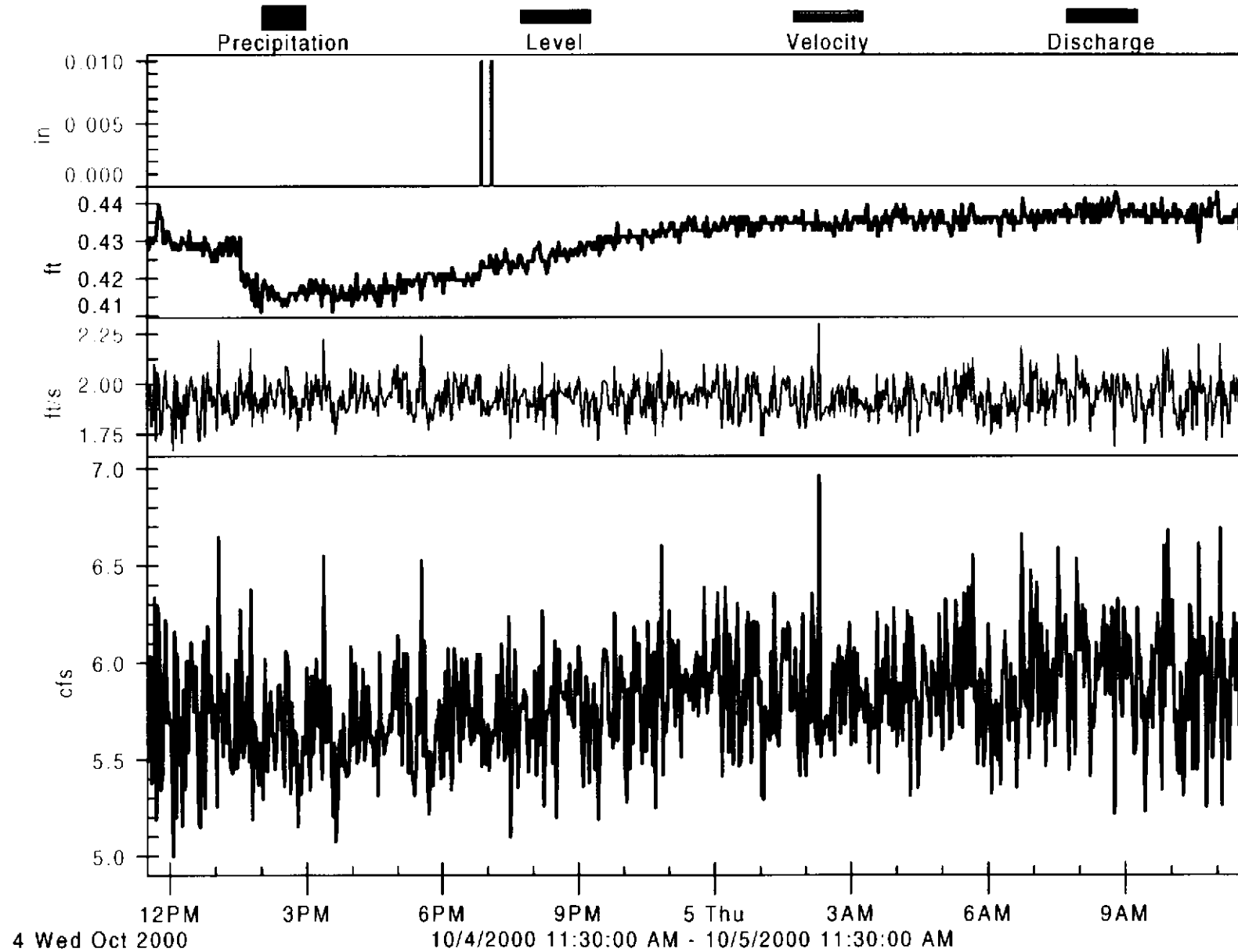
Original includes color coding.

SW-4 Fall Baseflow



Original includes color coding.

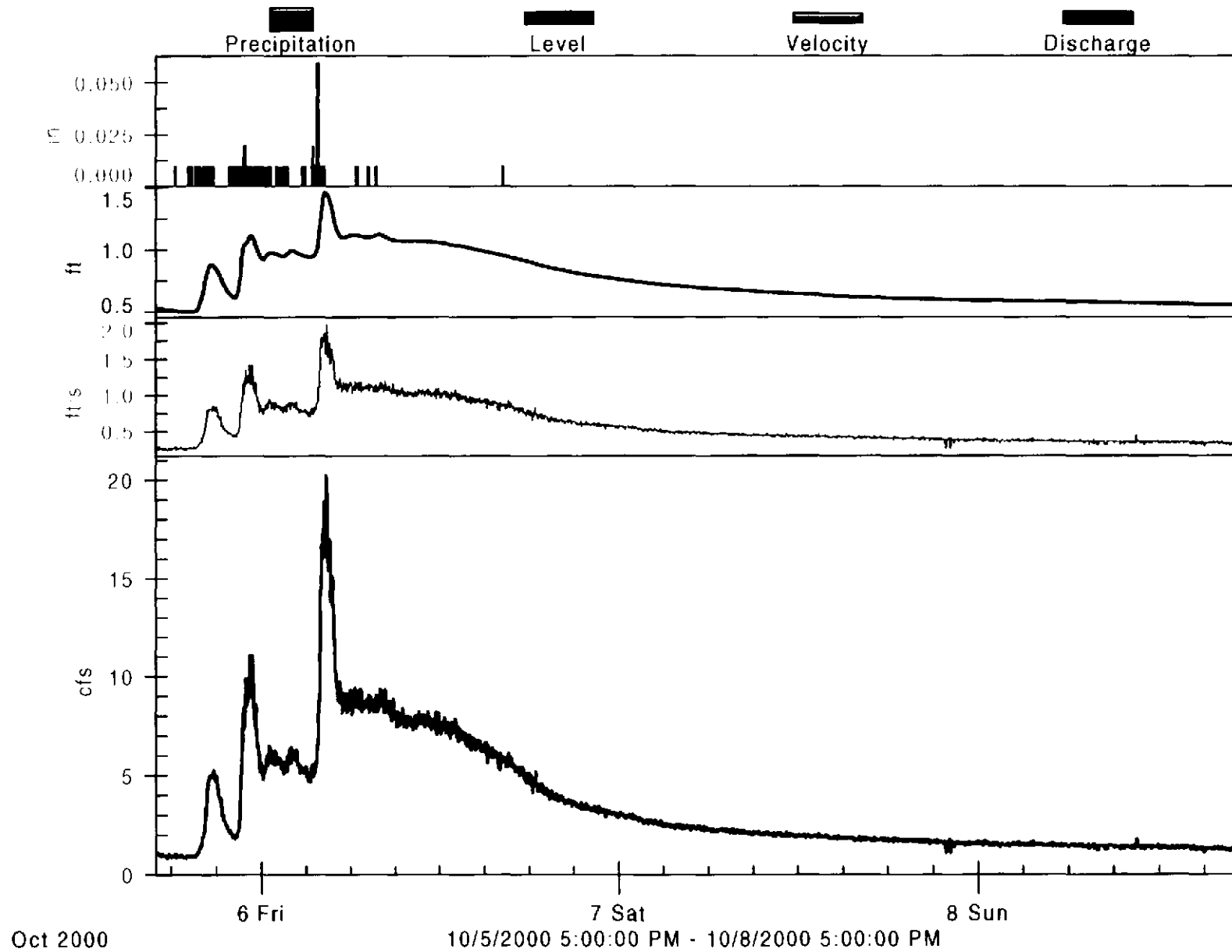
SW-9 Fall Baseflow



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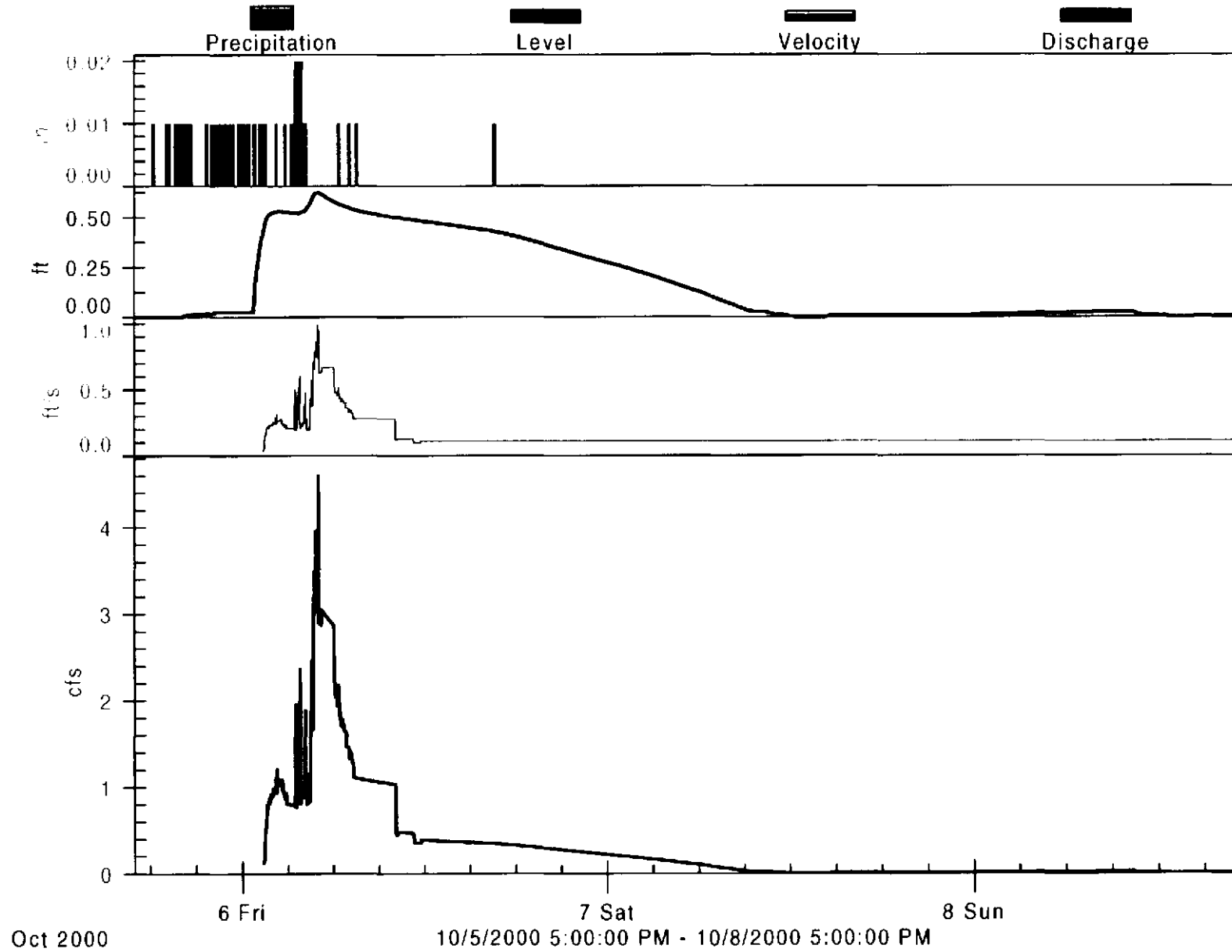
Fall Storm 1

SW-1 Fall Storm 1



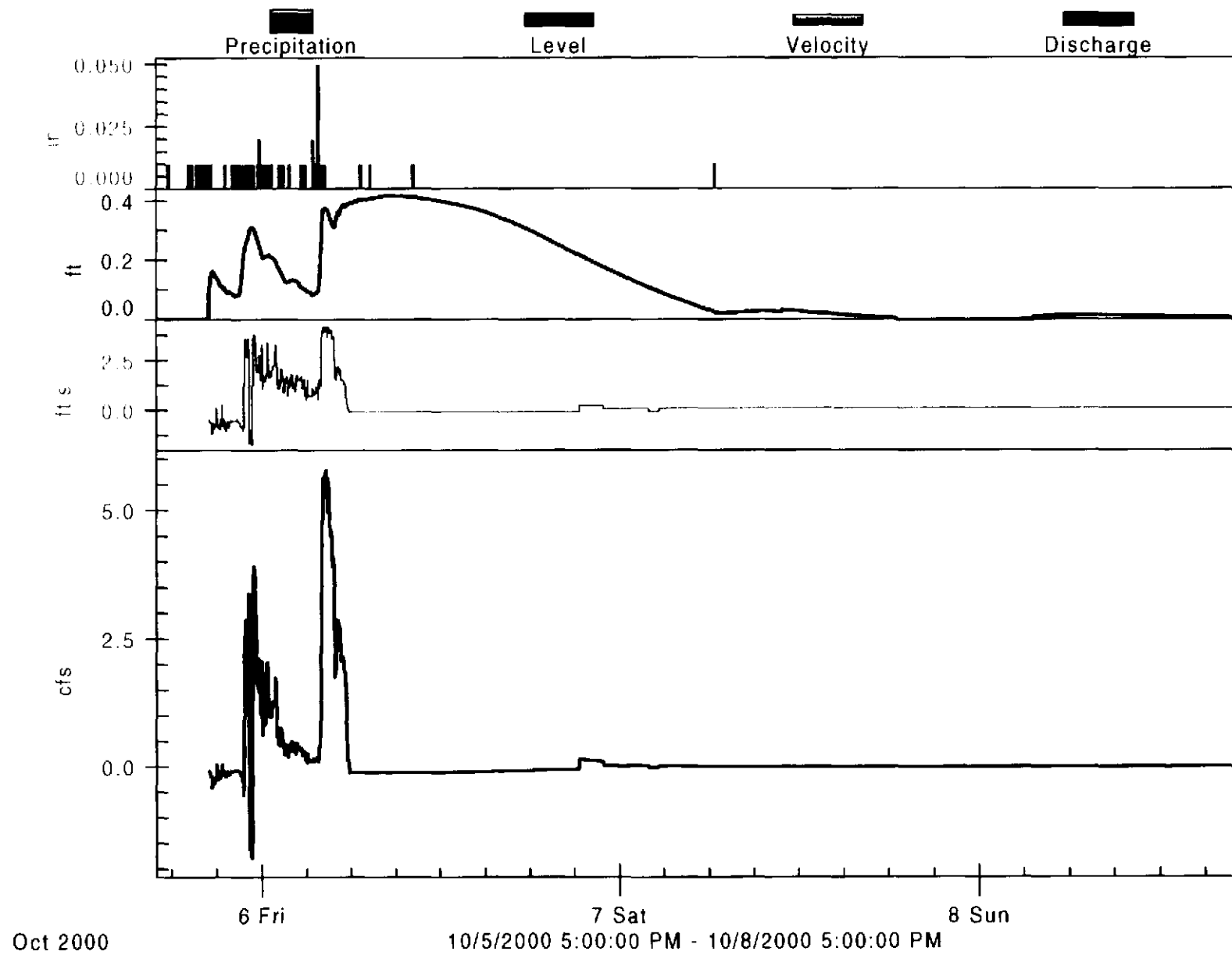
Original includes color coding.

SW-2 Fall Storm 1



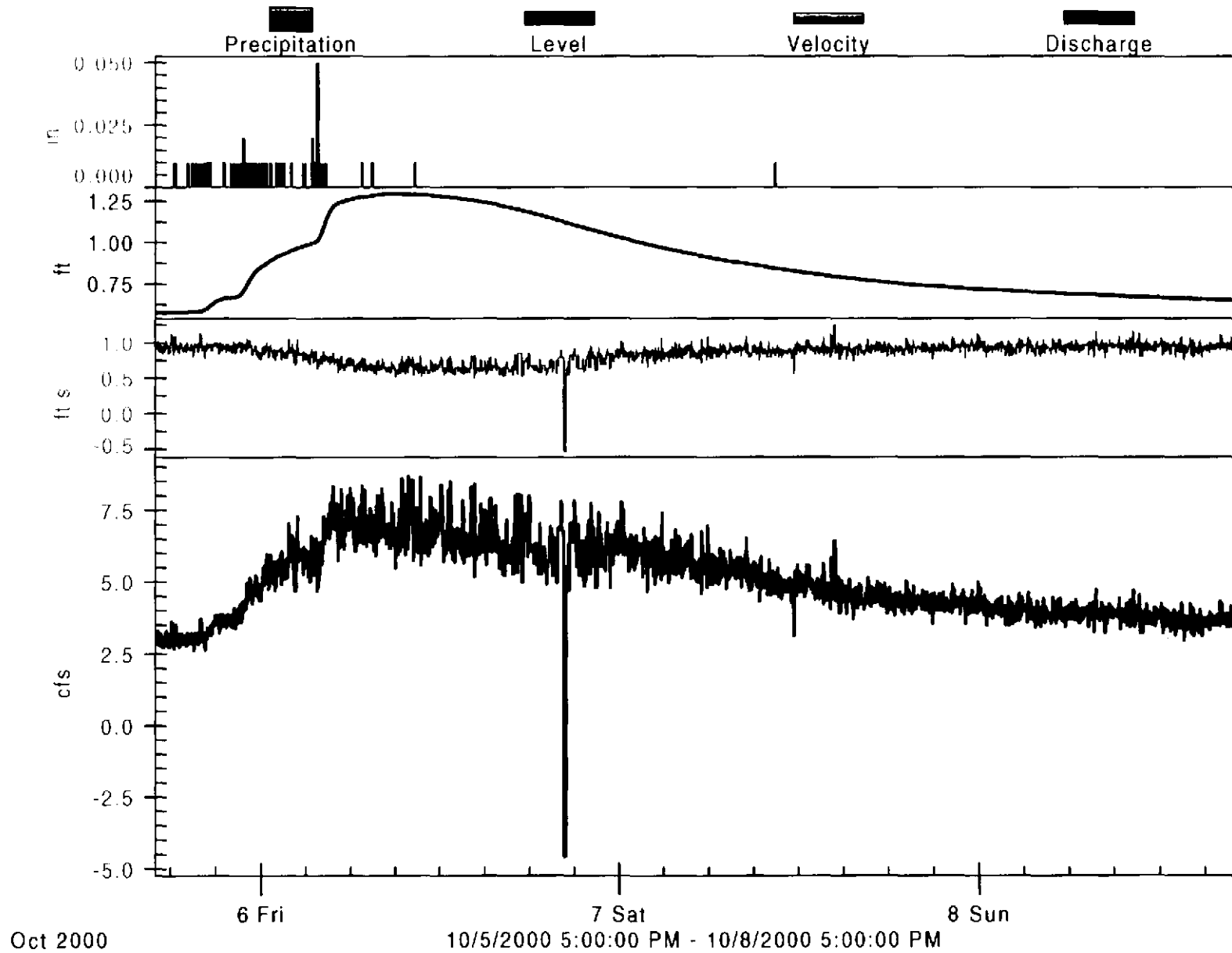
Original includes color coding.

SW-3 Fall Storm 1



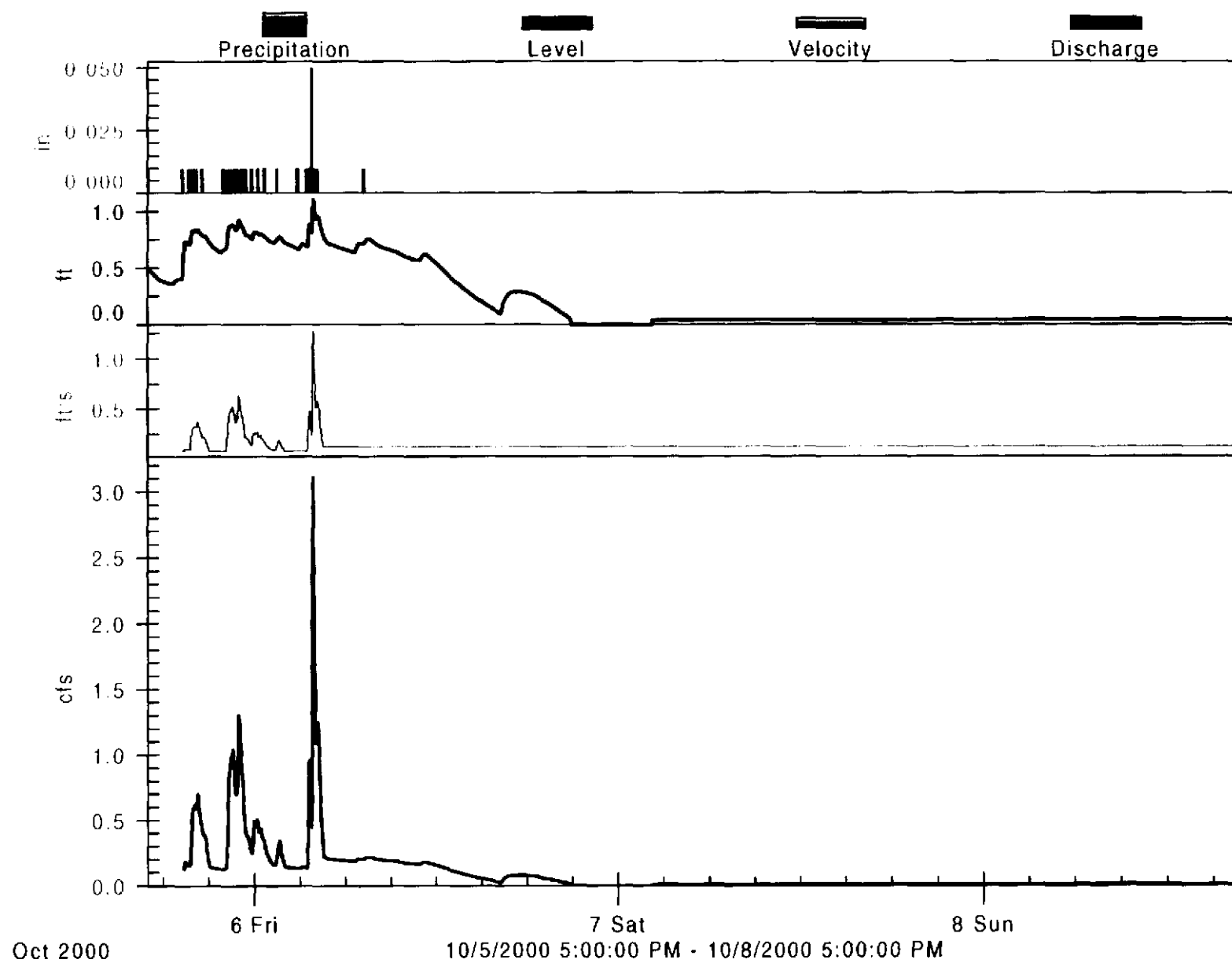
Original includes color coding.

SW-4 Fall Storm 1



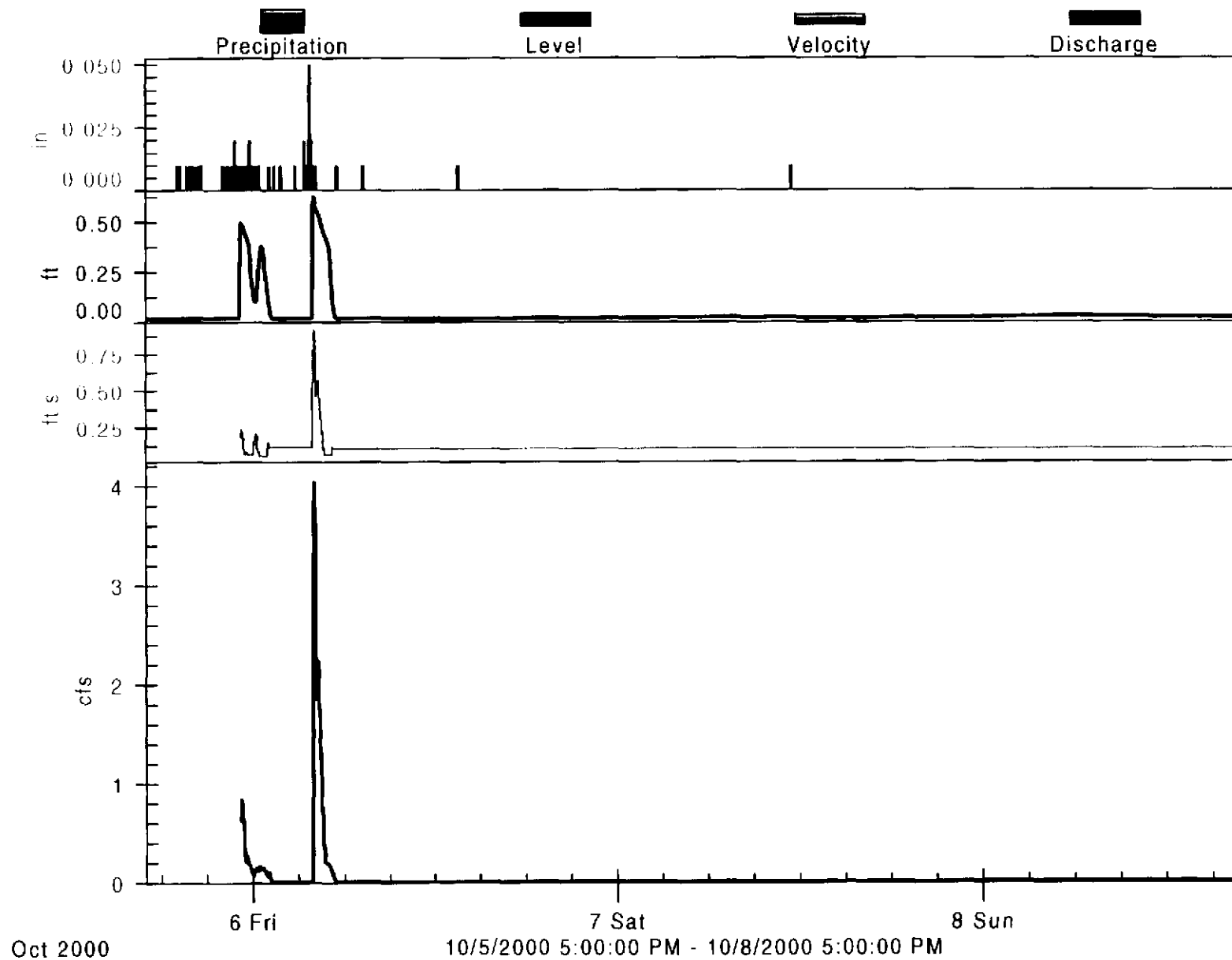
Original includes color coding.

SW-5 Fall Storm 1



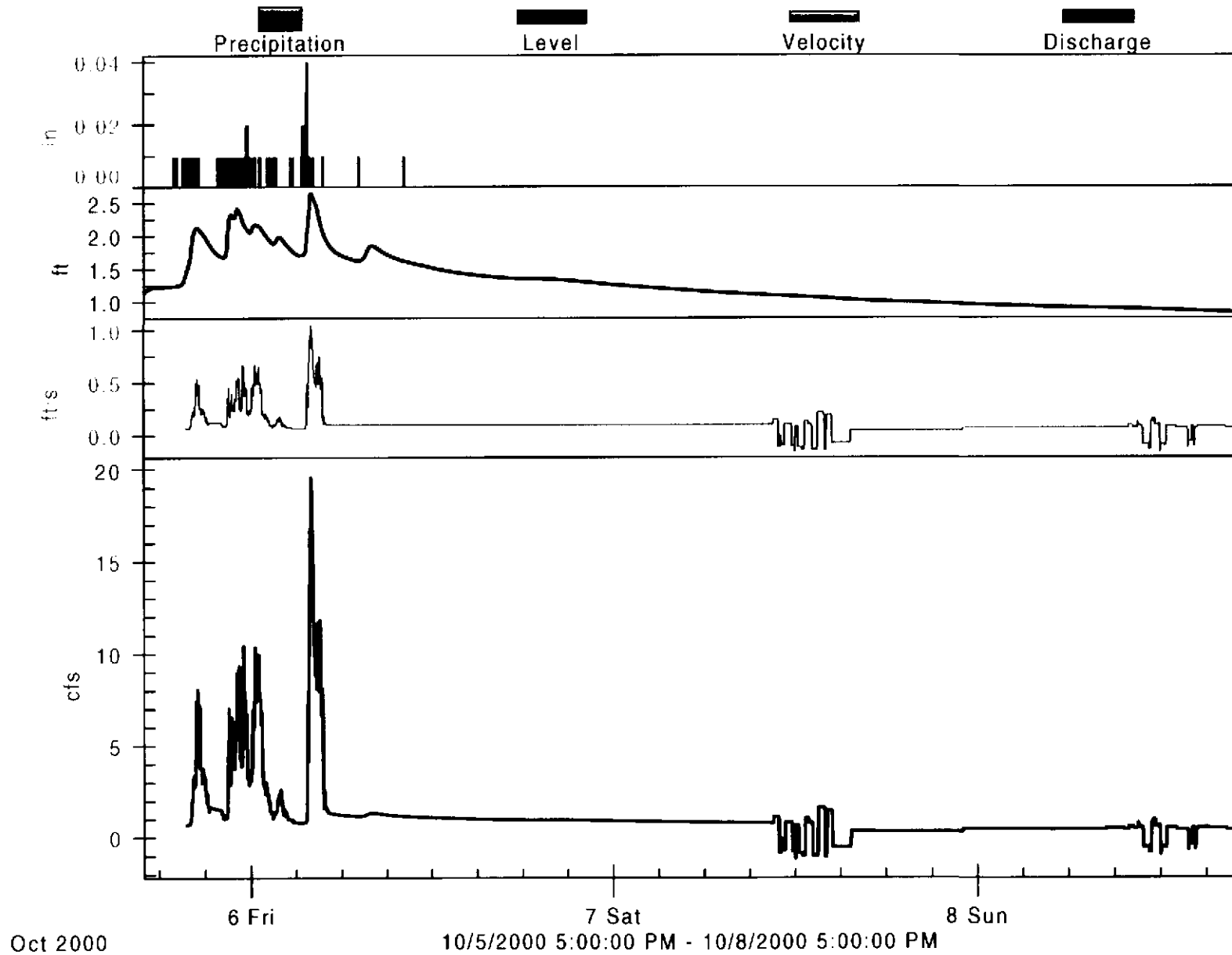
Original includes color coding.

SW-6 Fall Storm 1



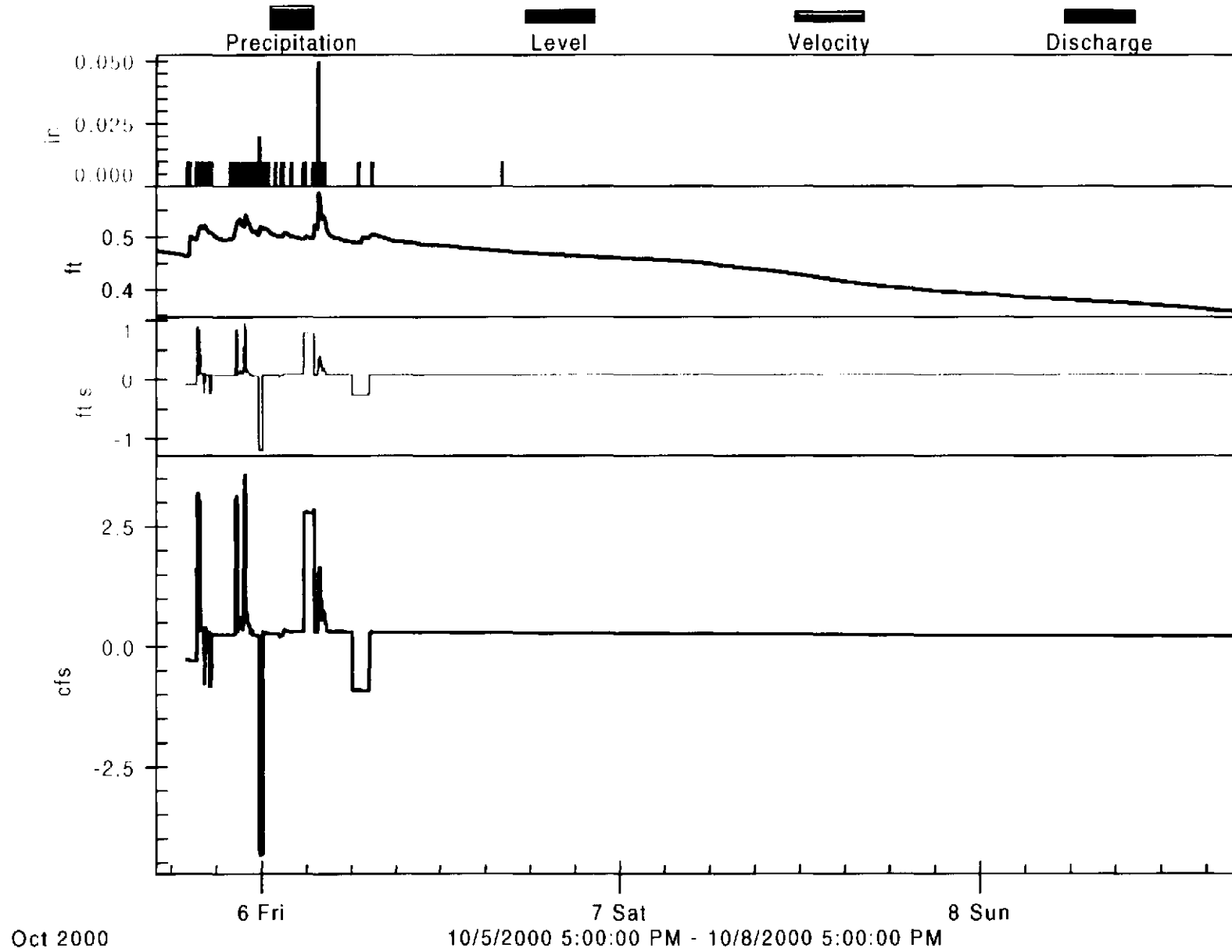
Original includes color coding.

SW-7 Fall Storm 1



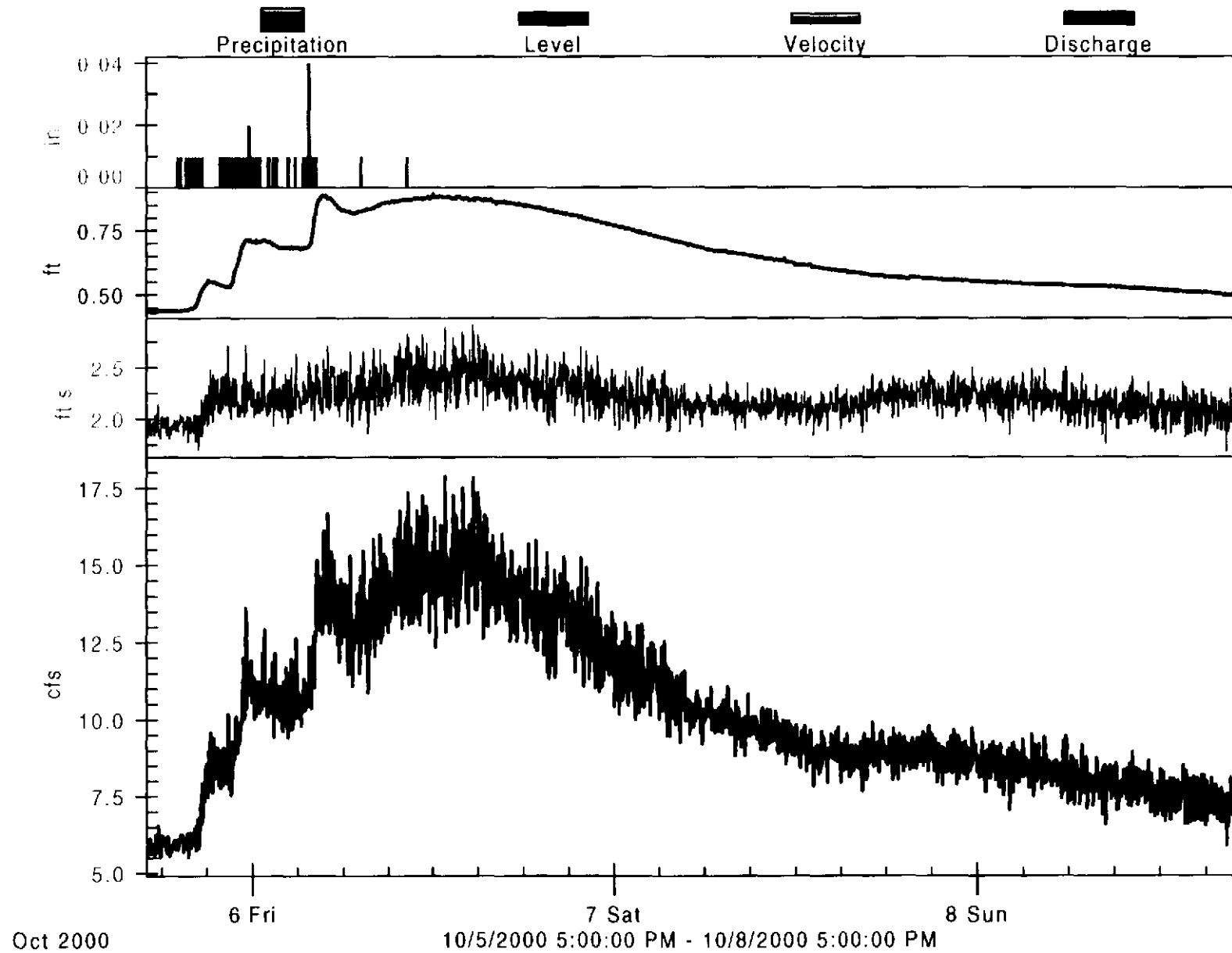
Original includes color coding.

SW-8 Fall Storm 1



Original includes color coding.

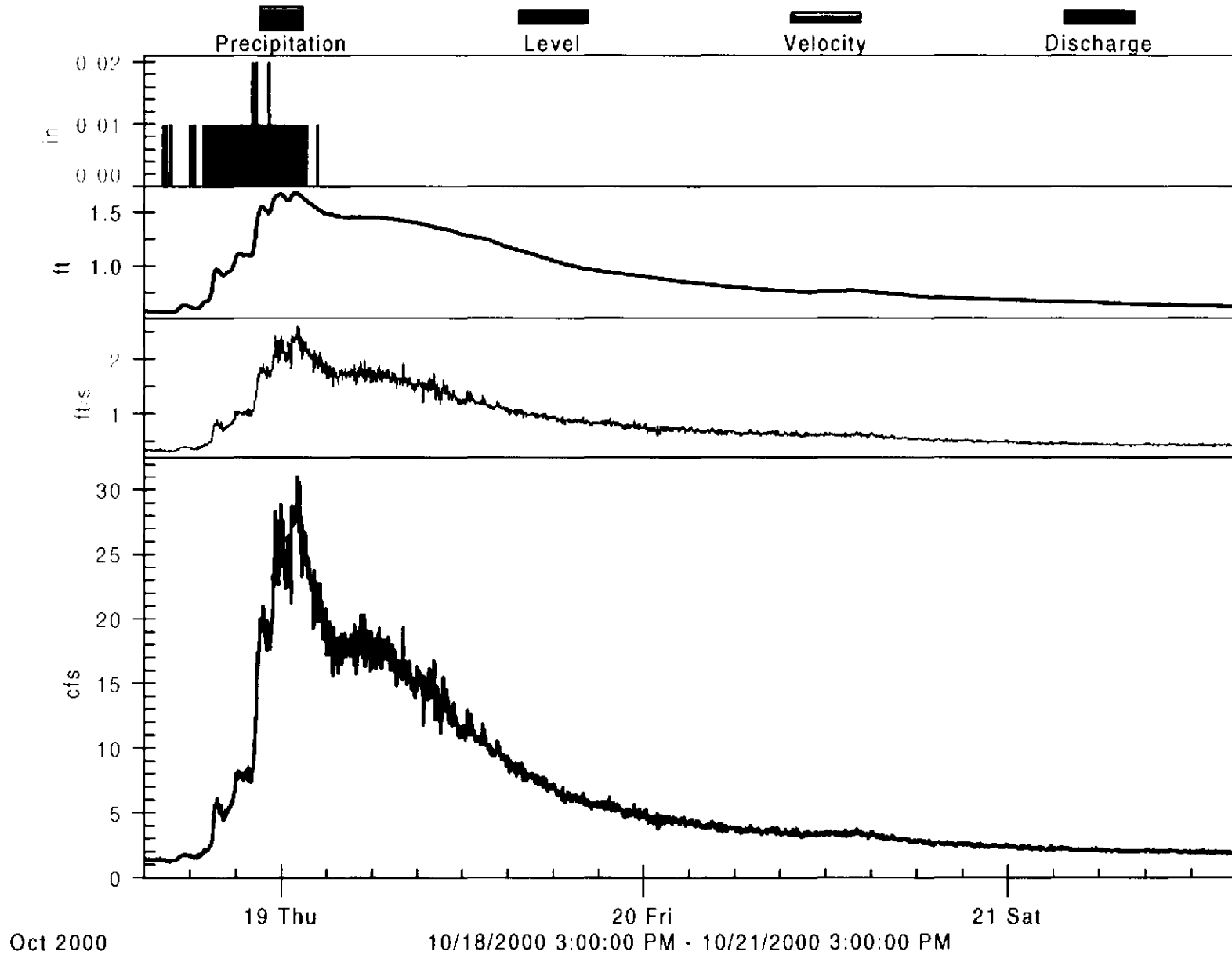
SW-9 Fall Storm 1



Original includes color coding.

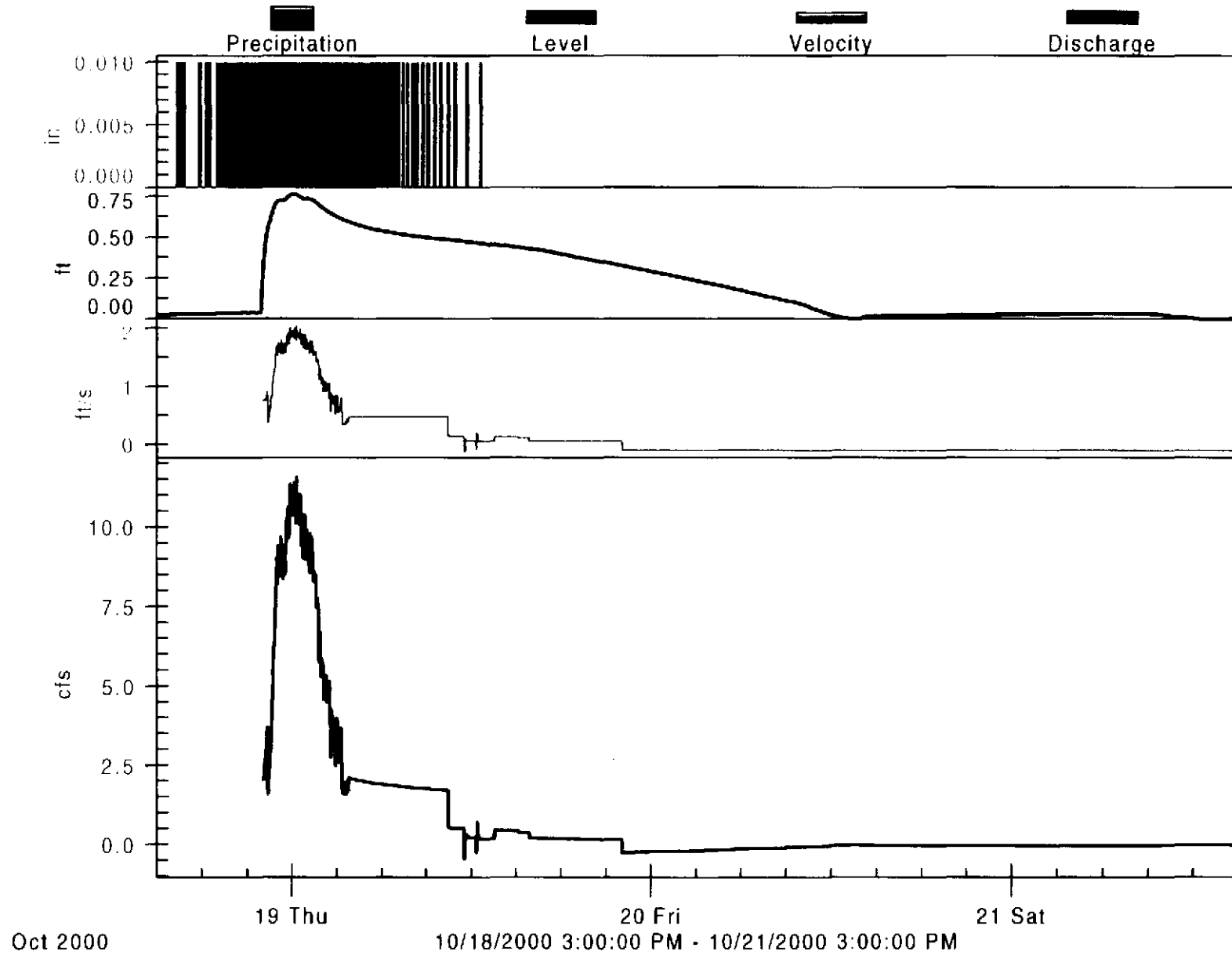
Fall Storm 2

SW-1 Fall Storm 2



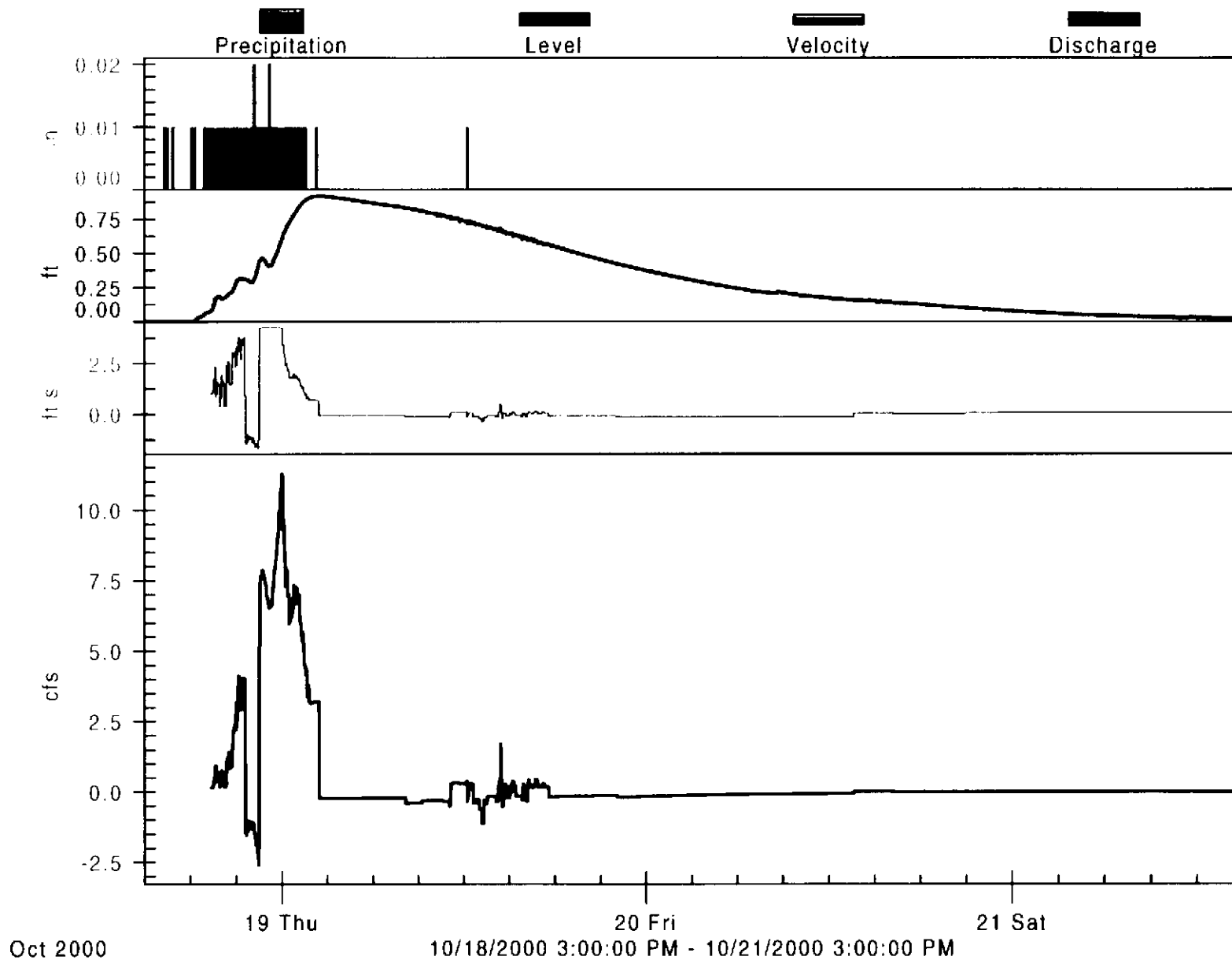
Original includes color coding.

SW-2 Fall Storm 2



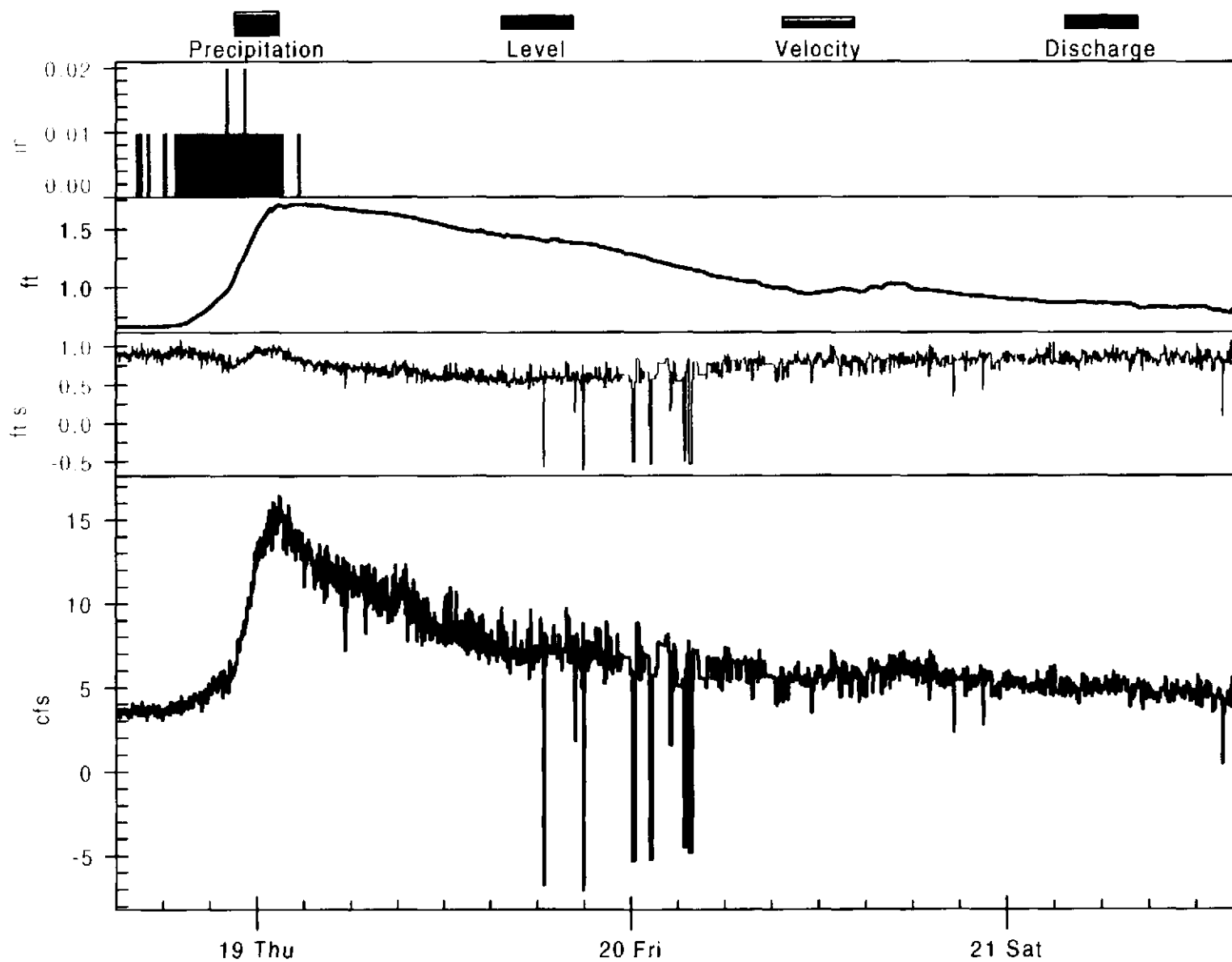
Original includes color coding.

SW-3 Fall Storm 2



Original includes color coding.

SW-4 Fall Storm 2

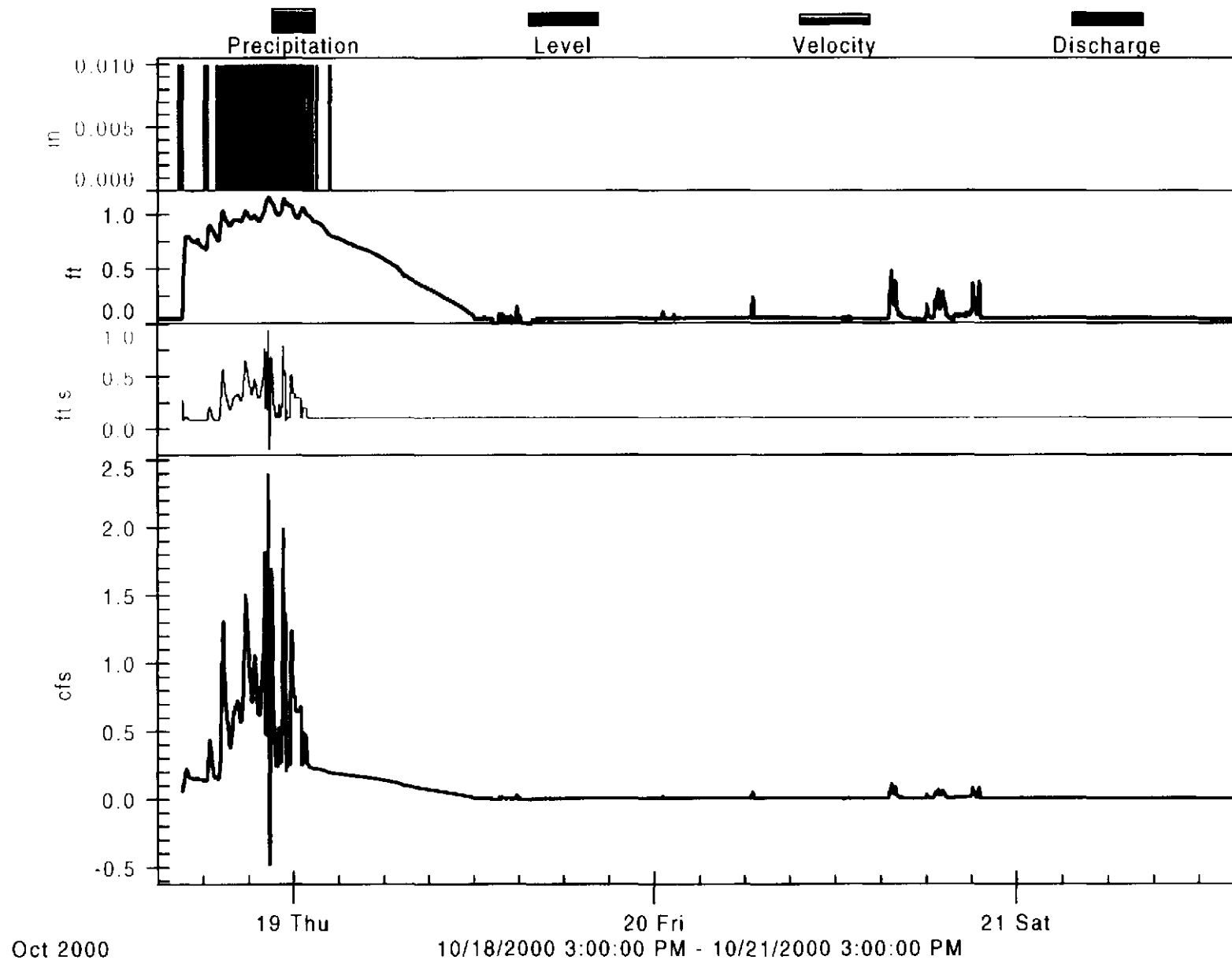


Oct 2000

10/18/2000 3:00:00 PM - 10/21/2000 3:00:00 PM

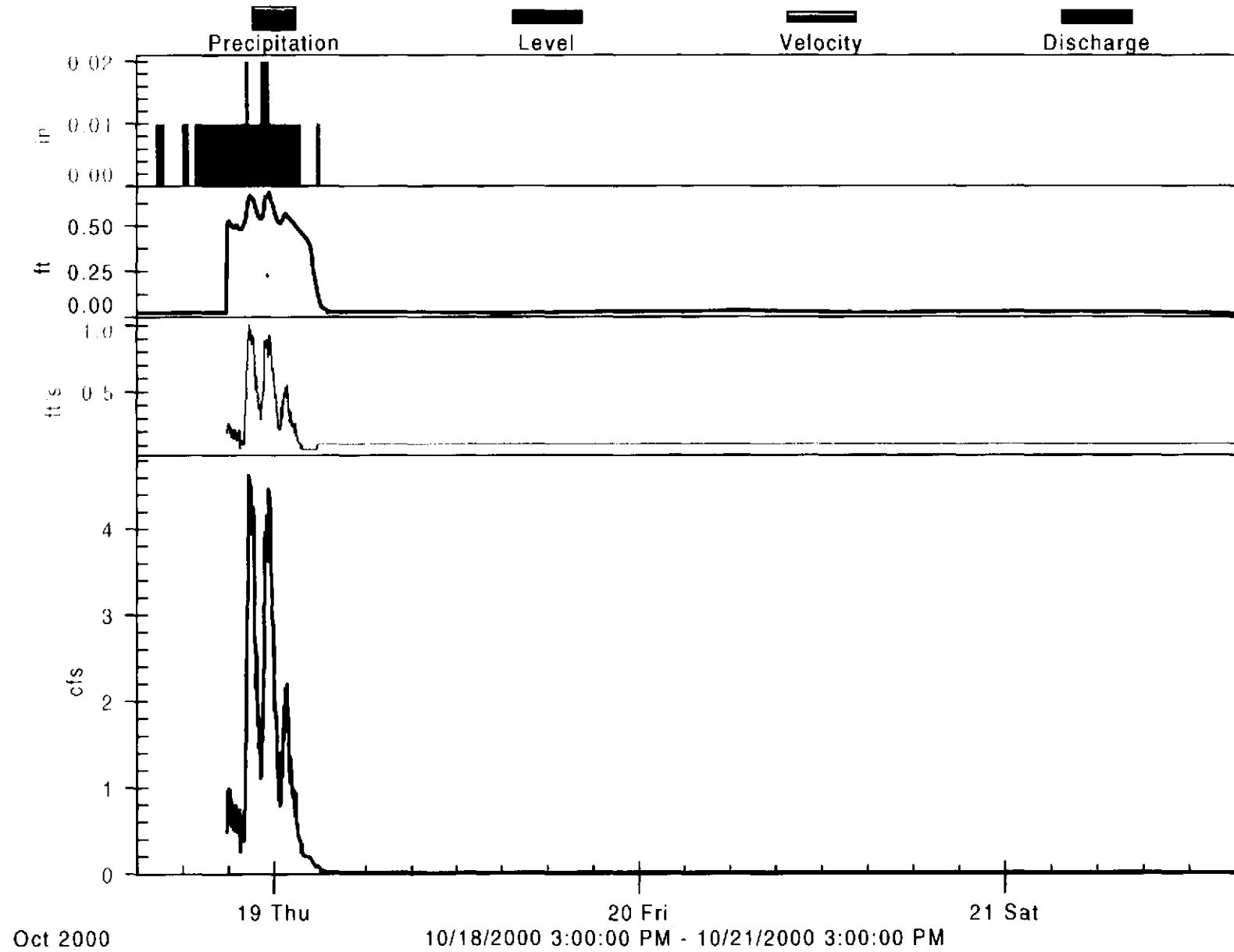
Original includes color coding.

SW-5 Fall Storm 2



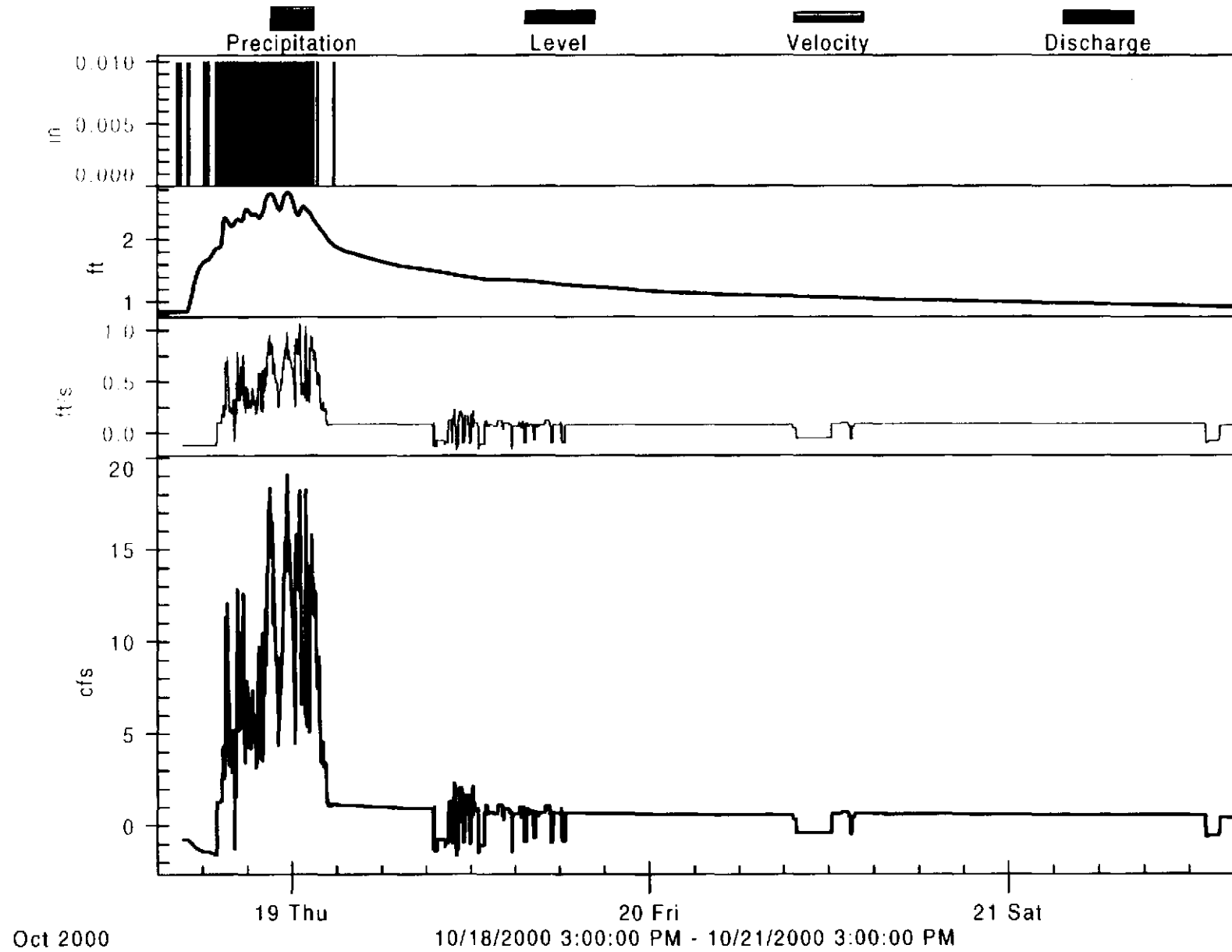
Original includes color coding.

SW-6 Fall Storm 2



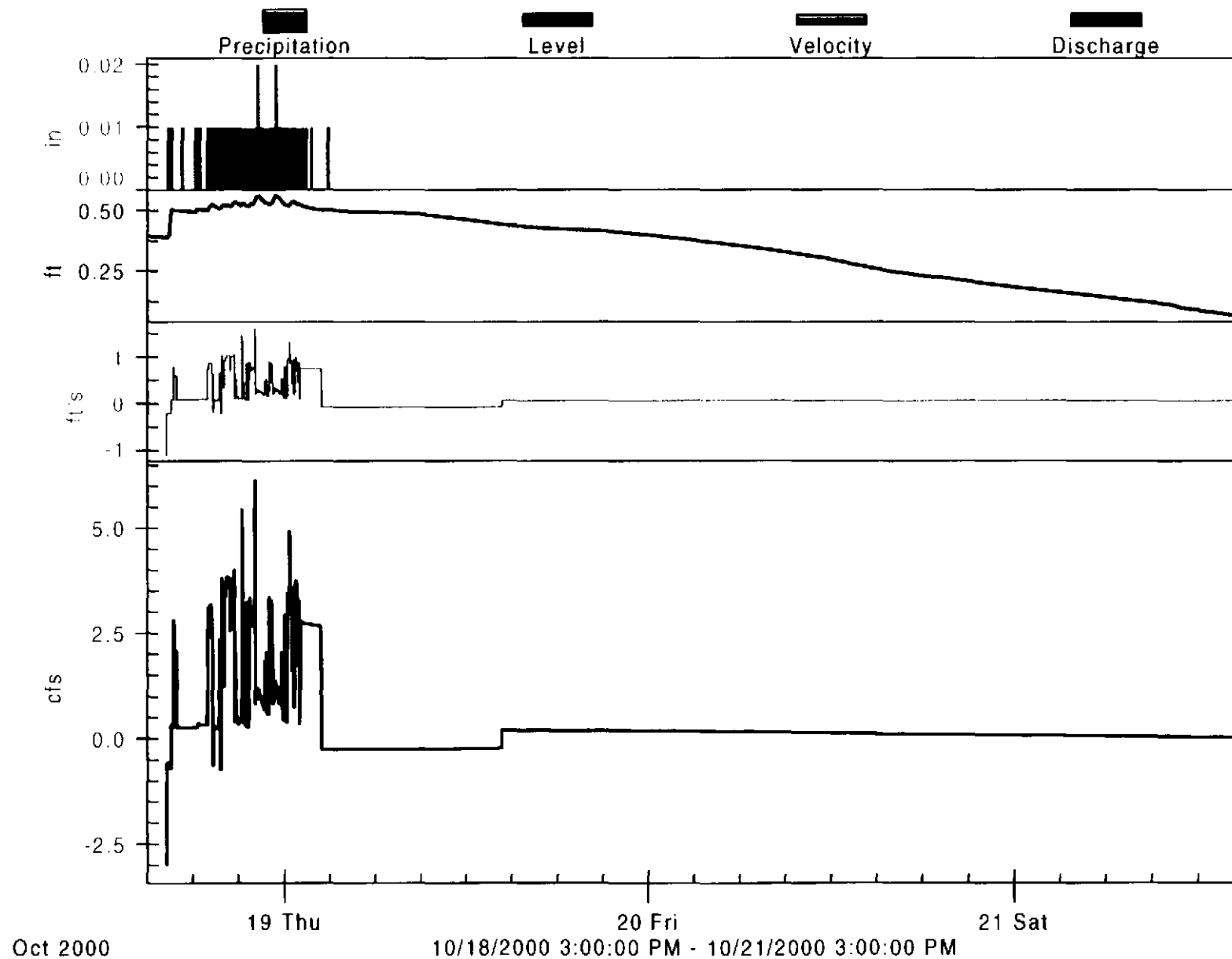
Original includes color coding.

SW-7 Fall Storm 2



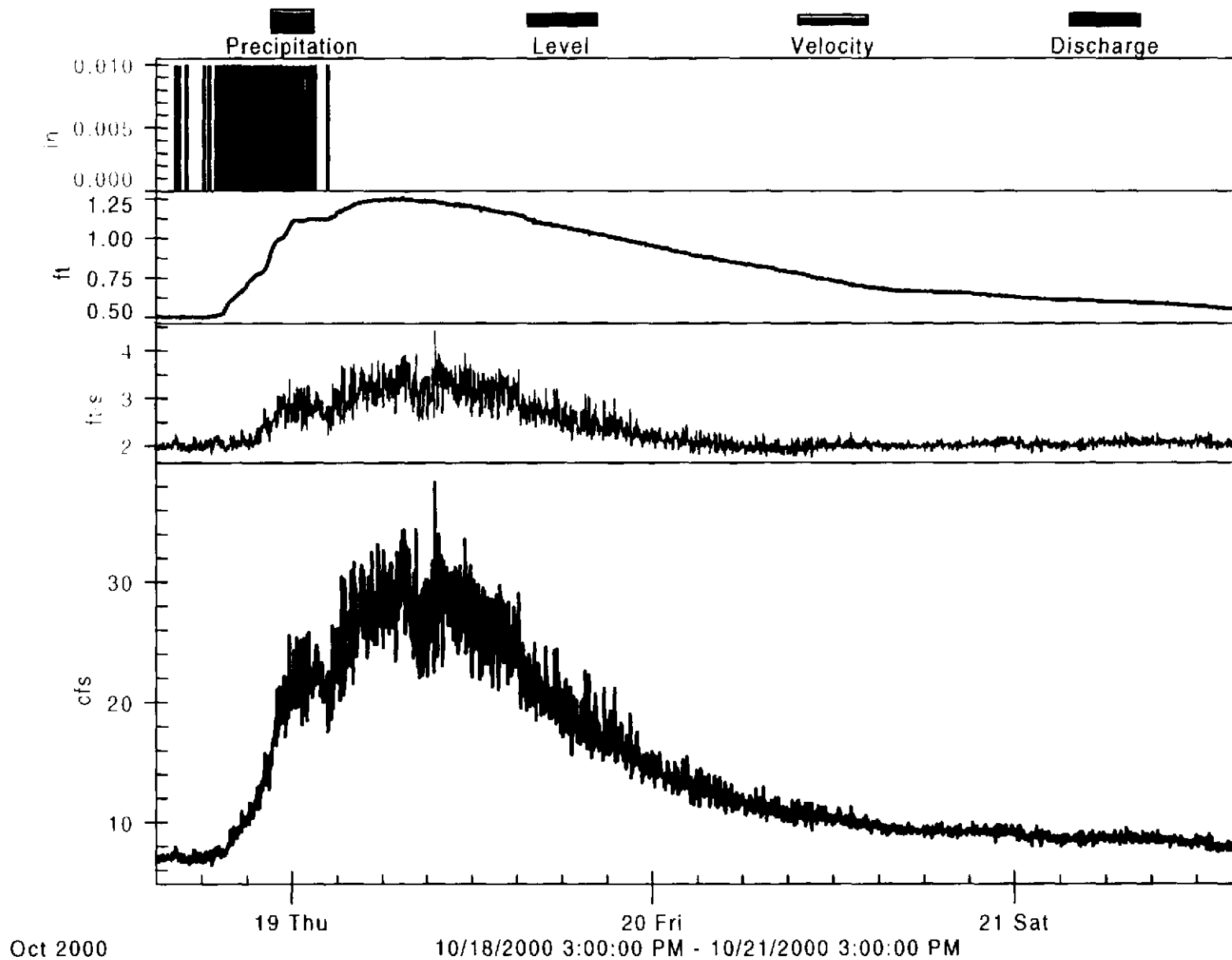
Original includes color coding.

SW-8 Fall Storm 2



Original includes color coding.

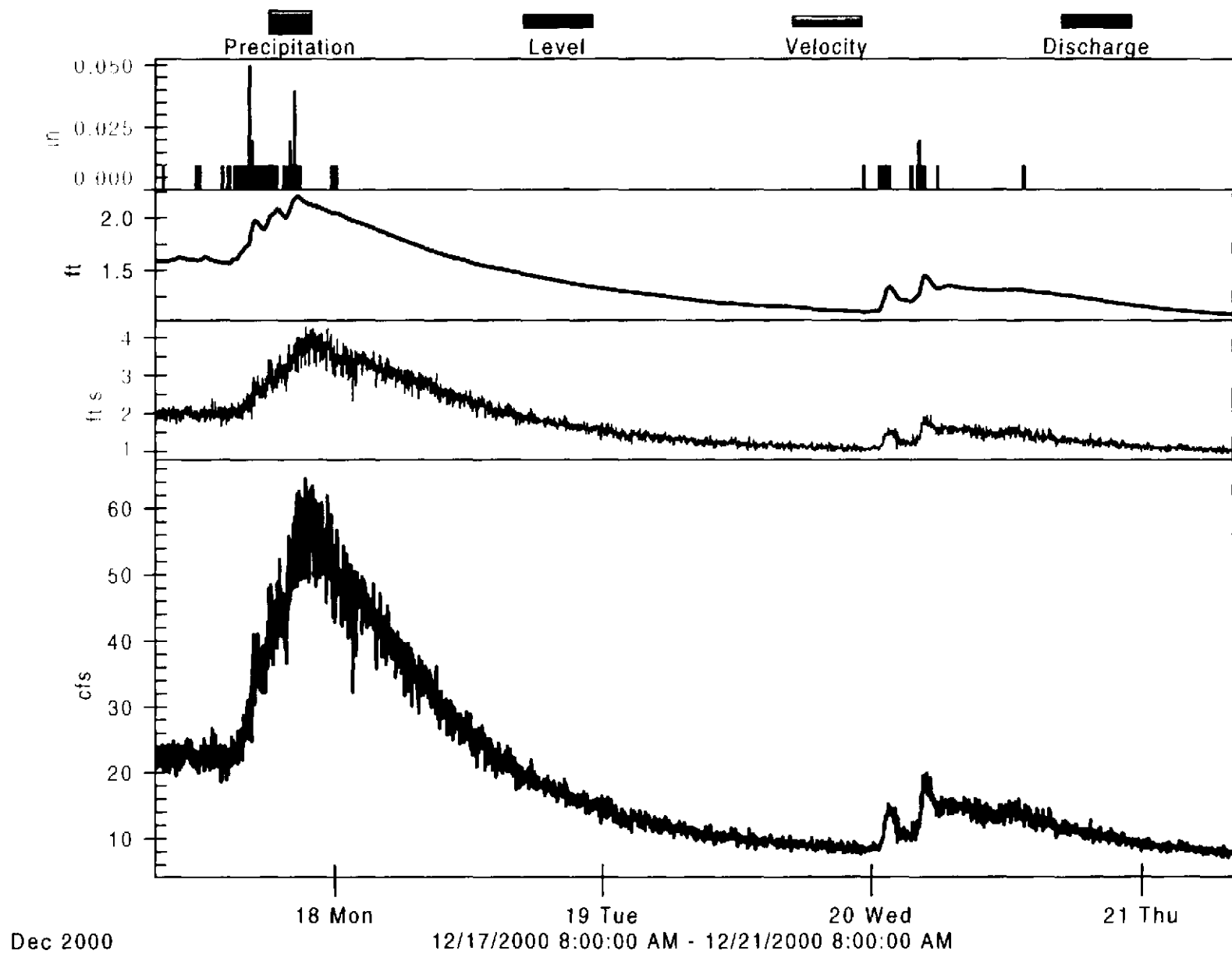
SW-9 Fall Storm 2



Original includes color coding.

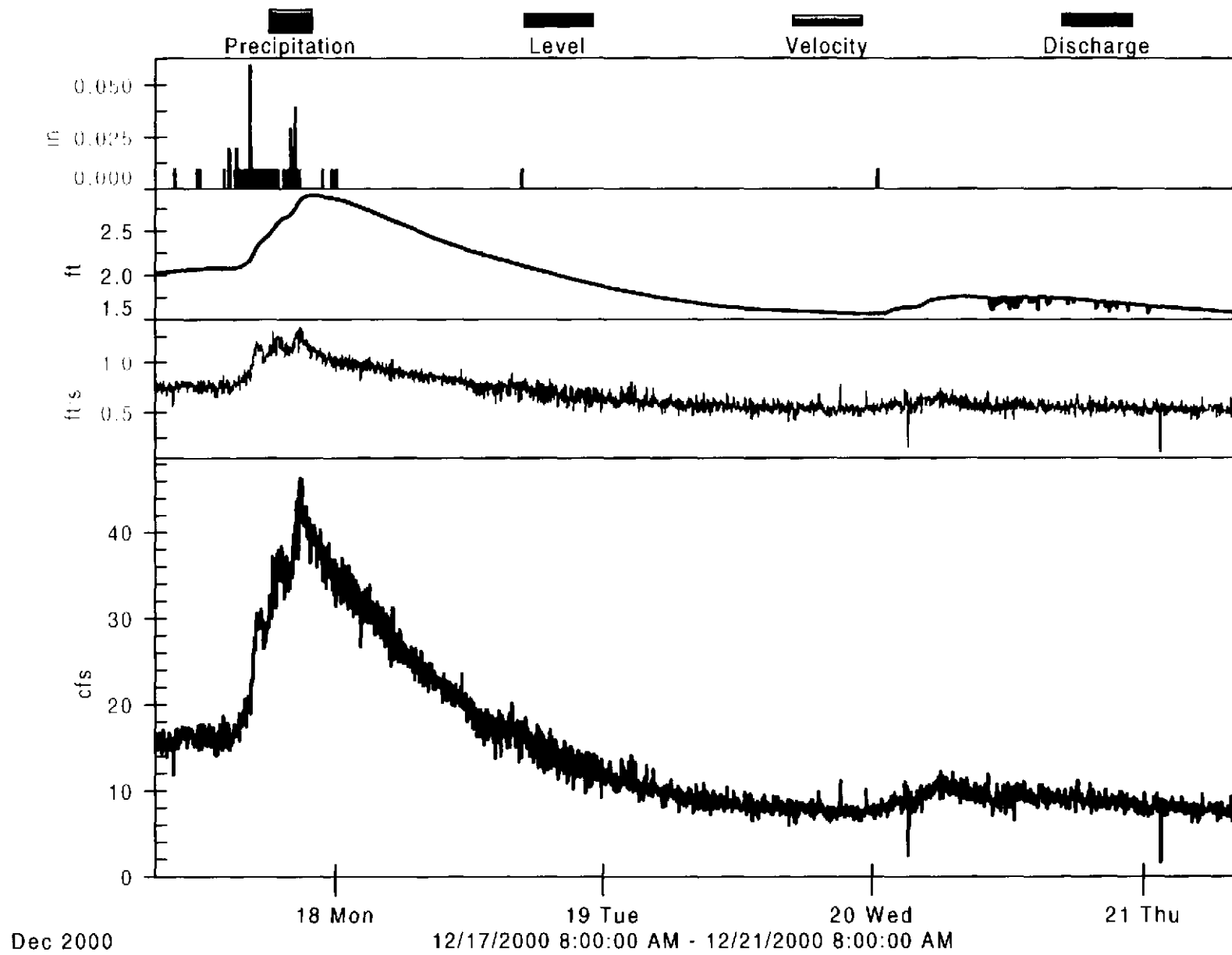
Post-Turnover Storm

SW-1 Post Turnover Event



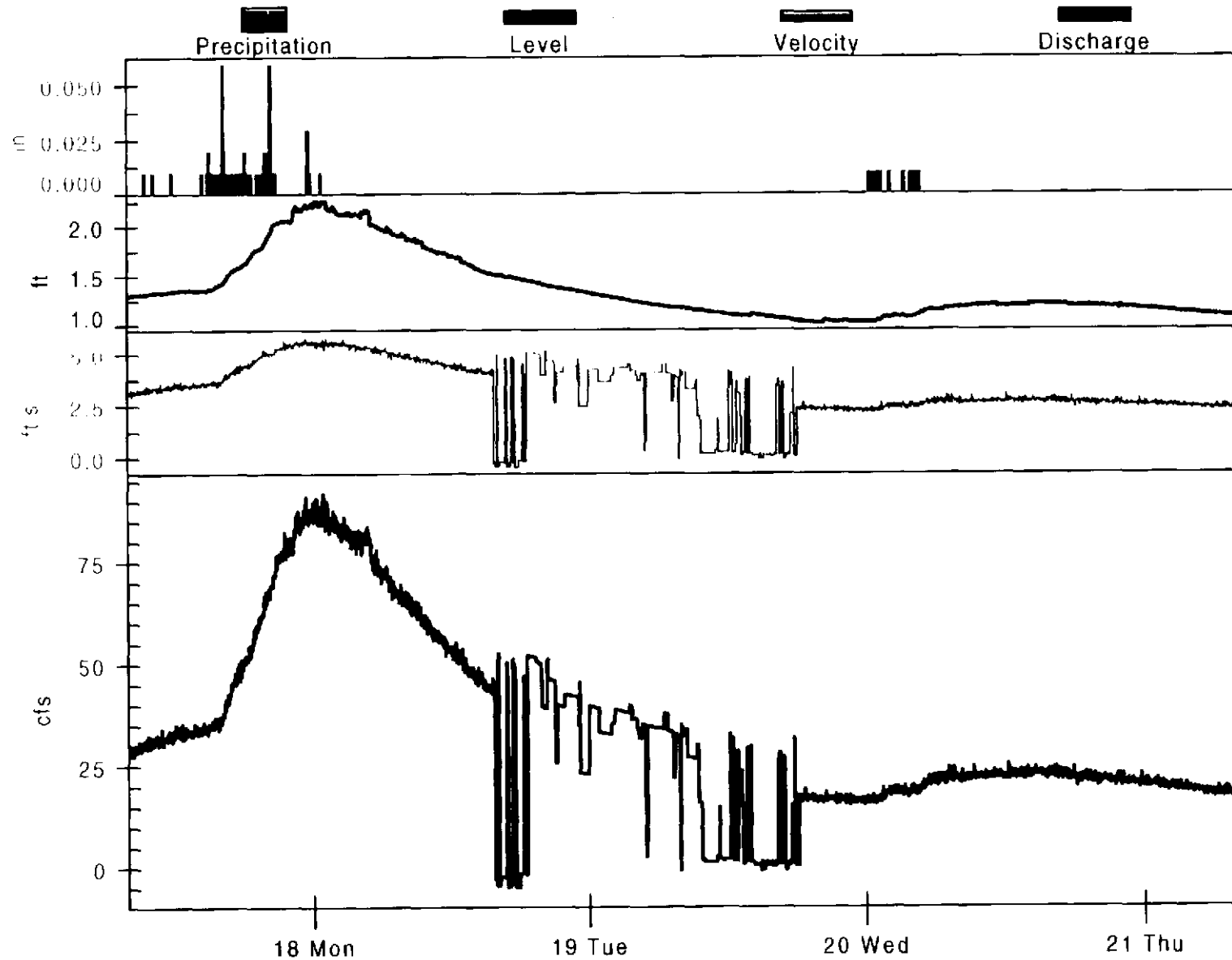
Original includes color coding.

SW-4 Post Turnover Event



Original includes color coding.

SW-9 Post Turnover Event



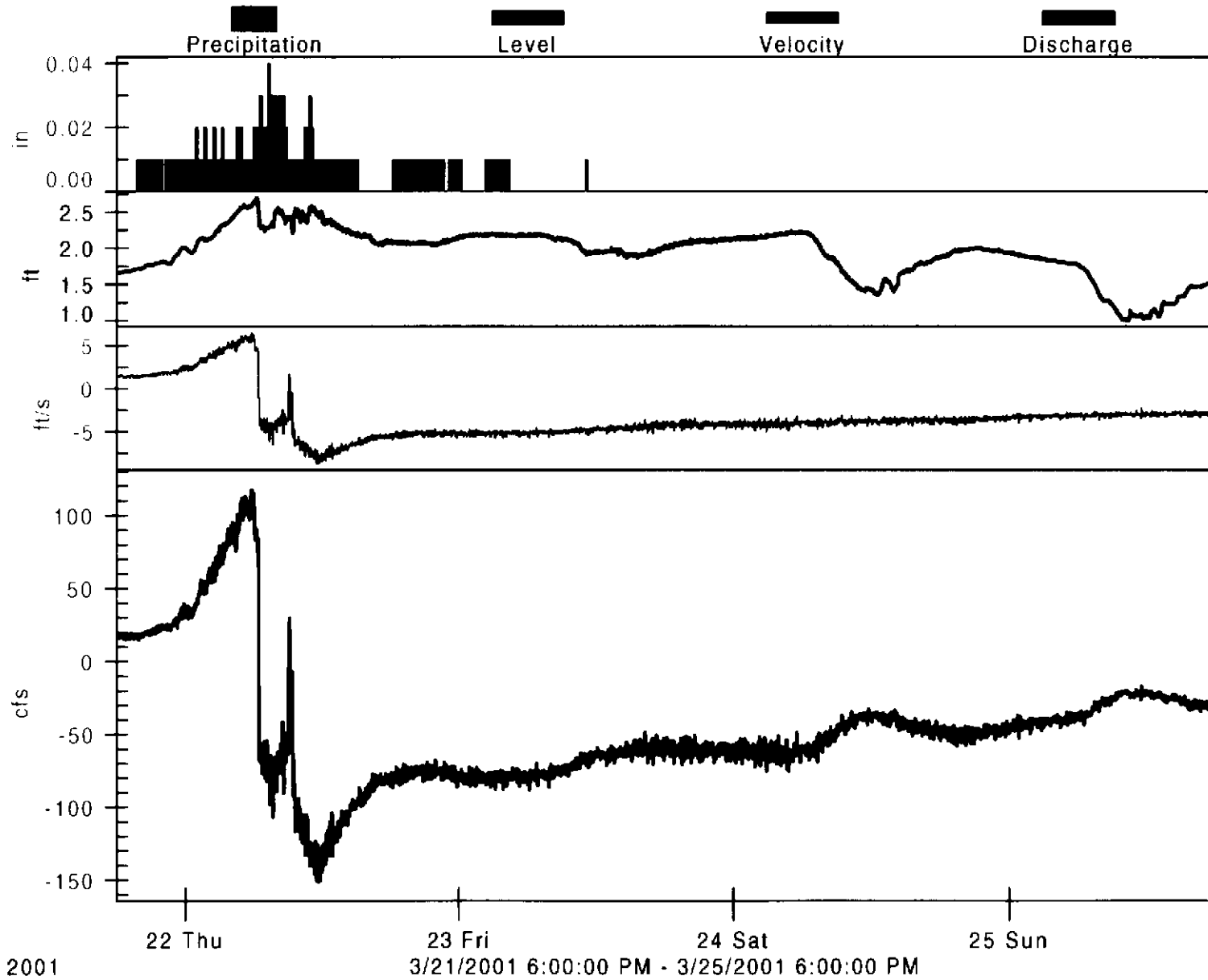
Dec 2000

12/17/2000 8:00:00 AM - 12/21/2000 8:00:00 AM

Original includes color coding.

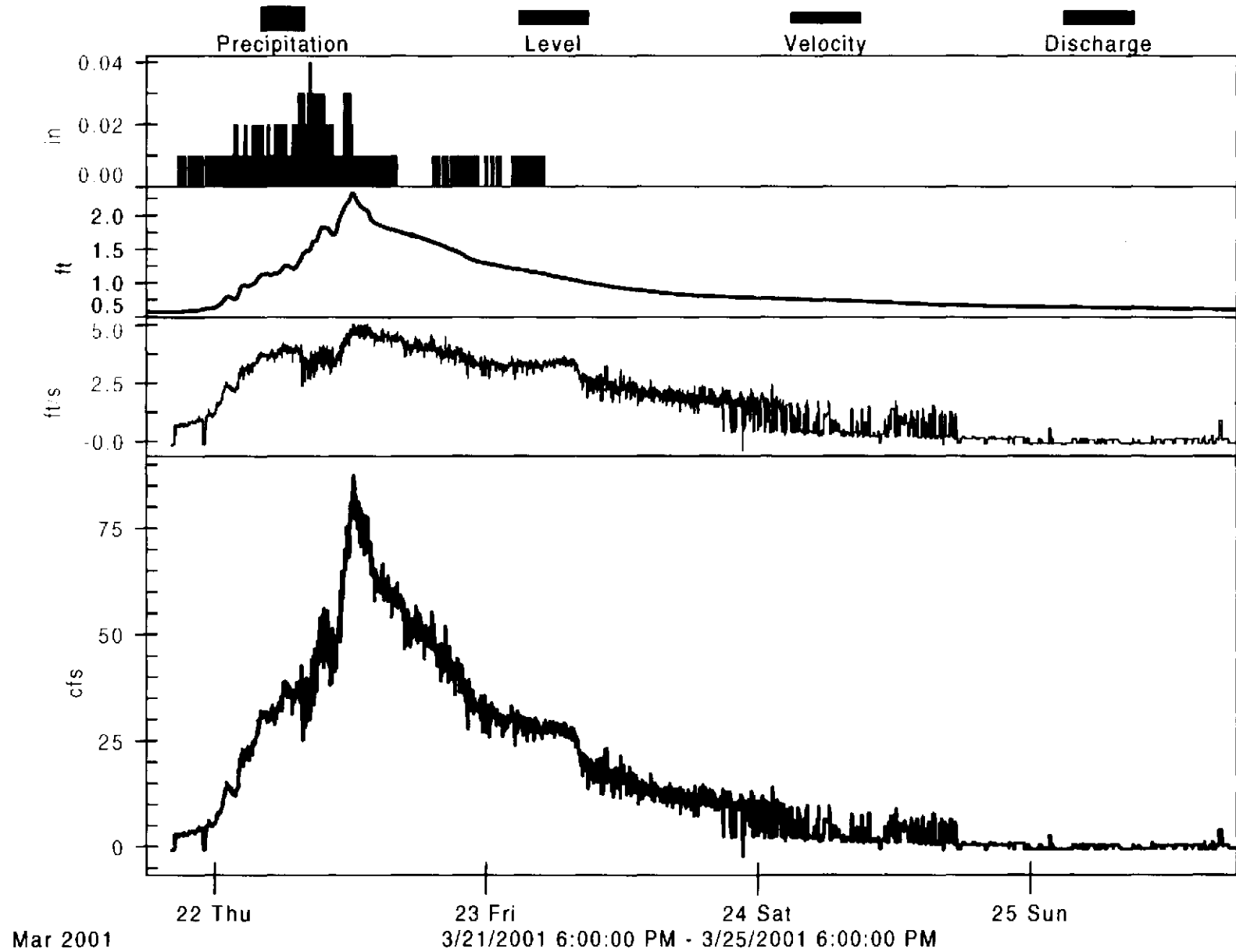
Spring Storm 1

SW-1 Spring Storm 1



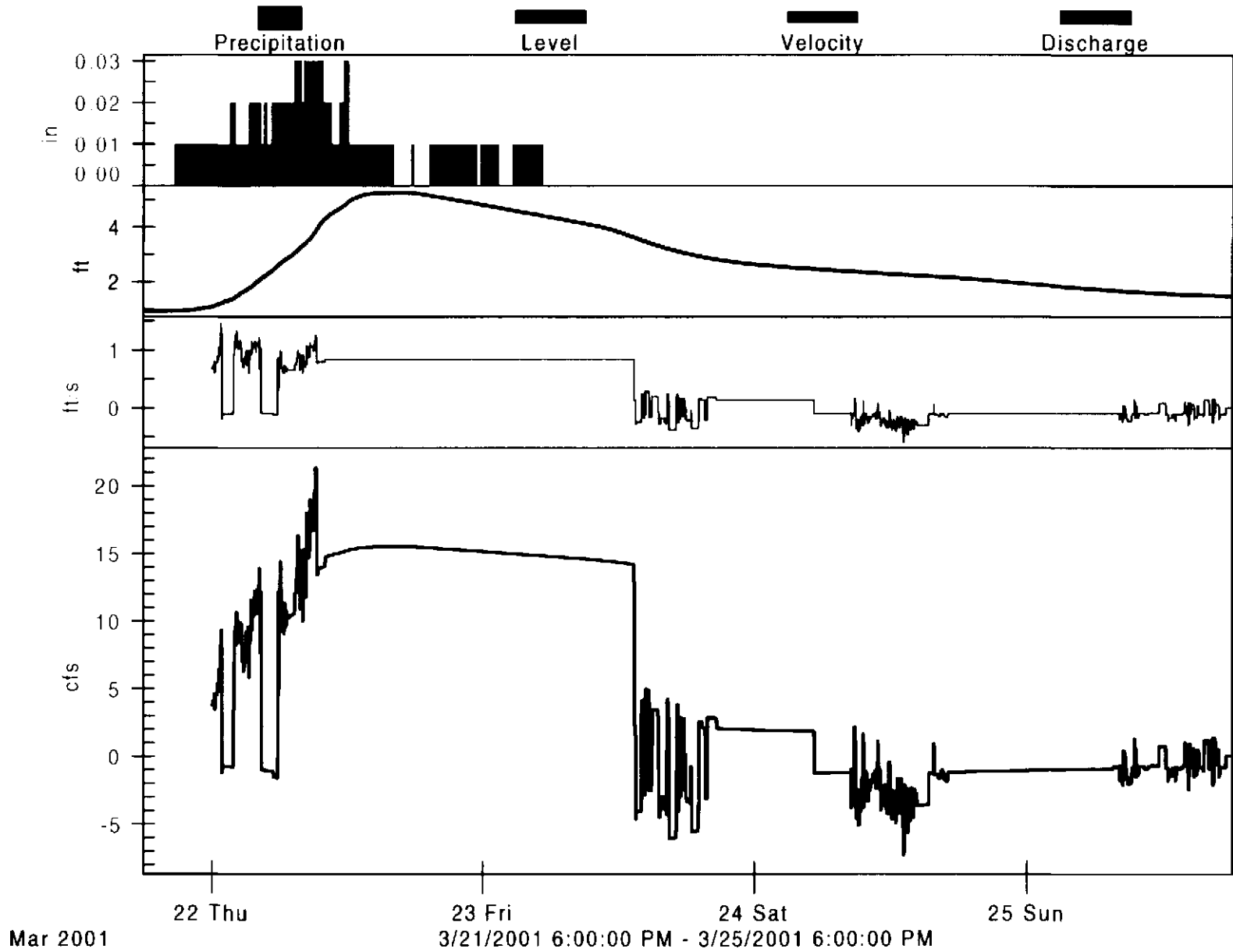
Original includes color coding.

SW-2 Spring Storm 1



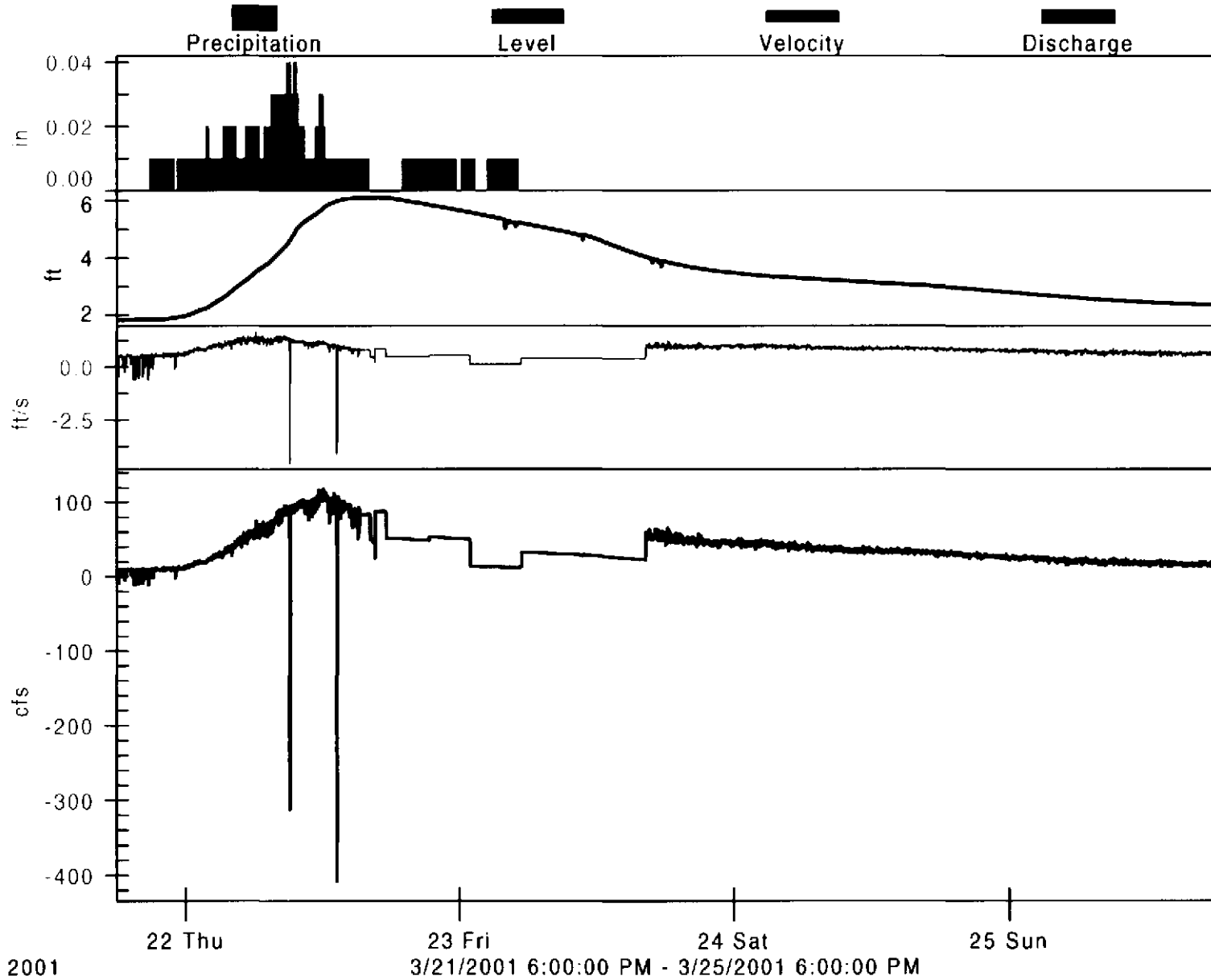
Original includes color coding.

SW-3 Spring Storm 1



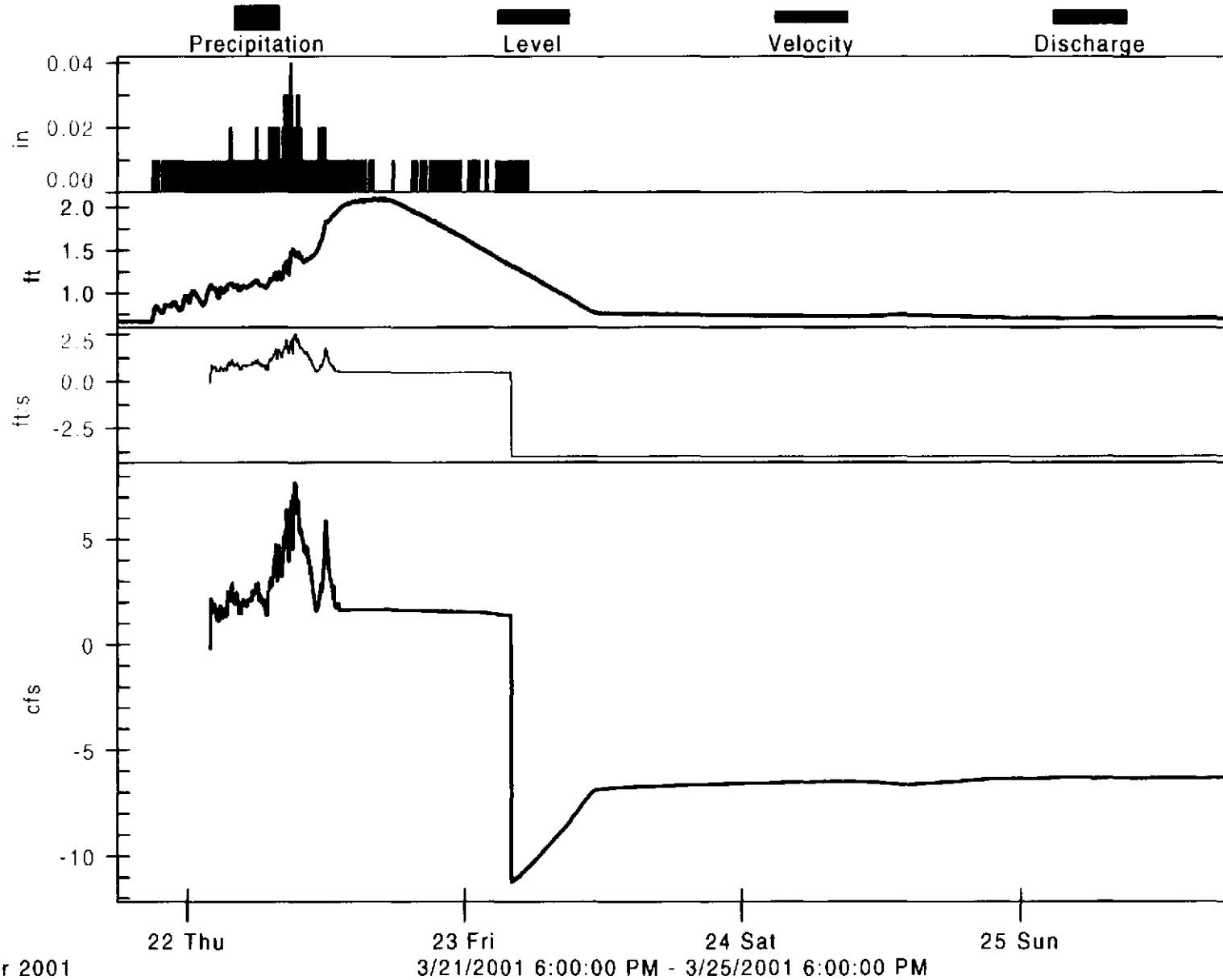
Original includes color coding.

SW-4 Spring Storm 1



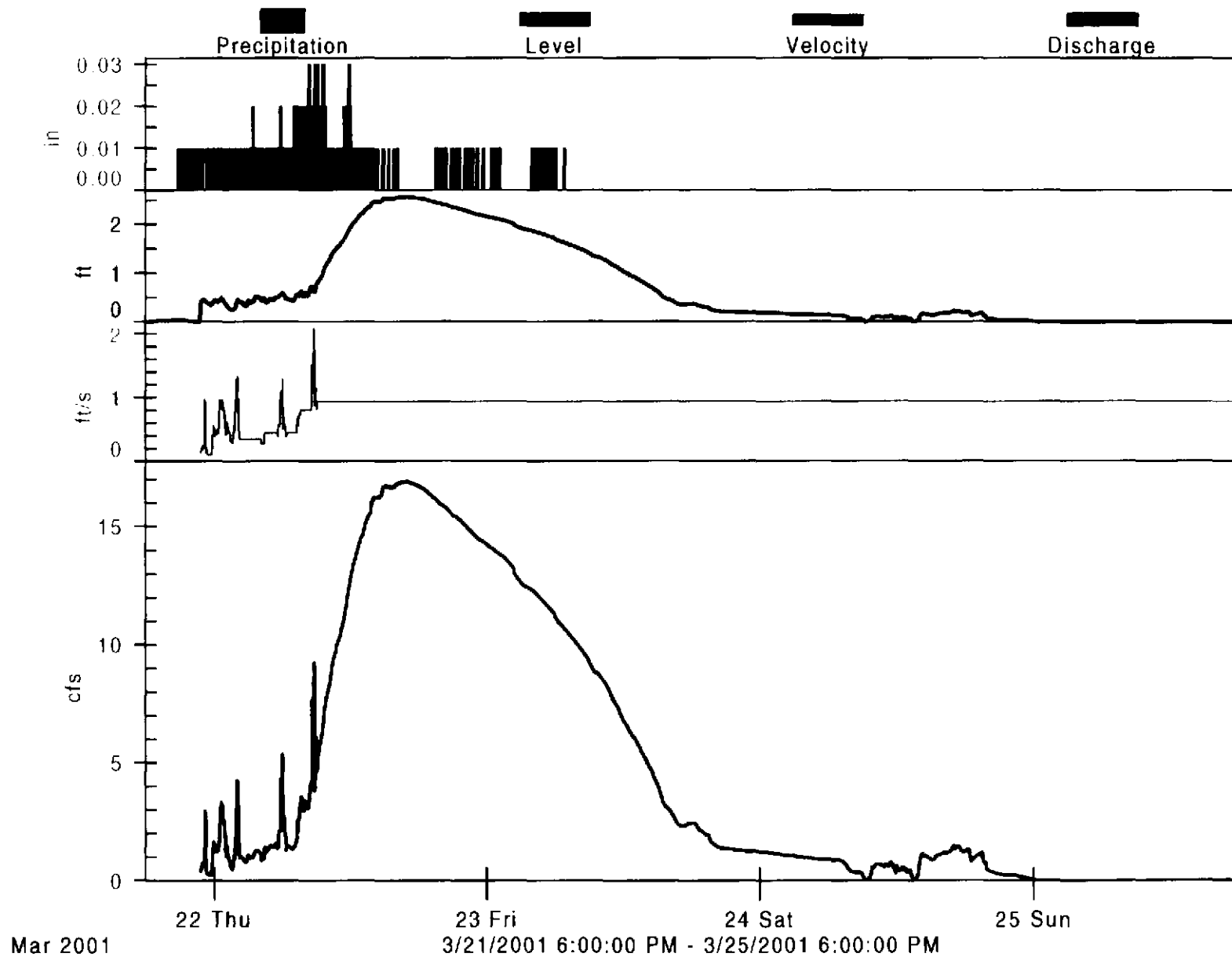
Original includes color coding.

SW-5 Spring Storm 1



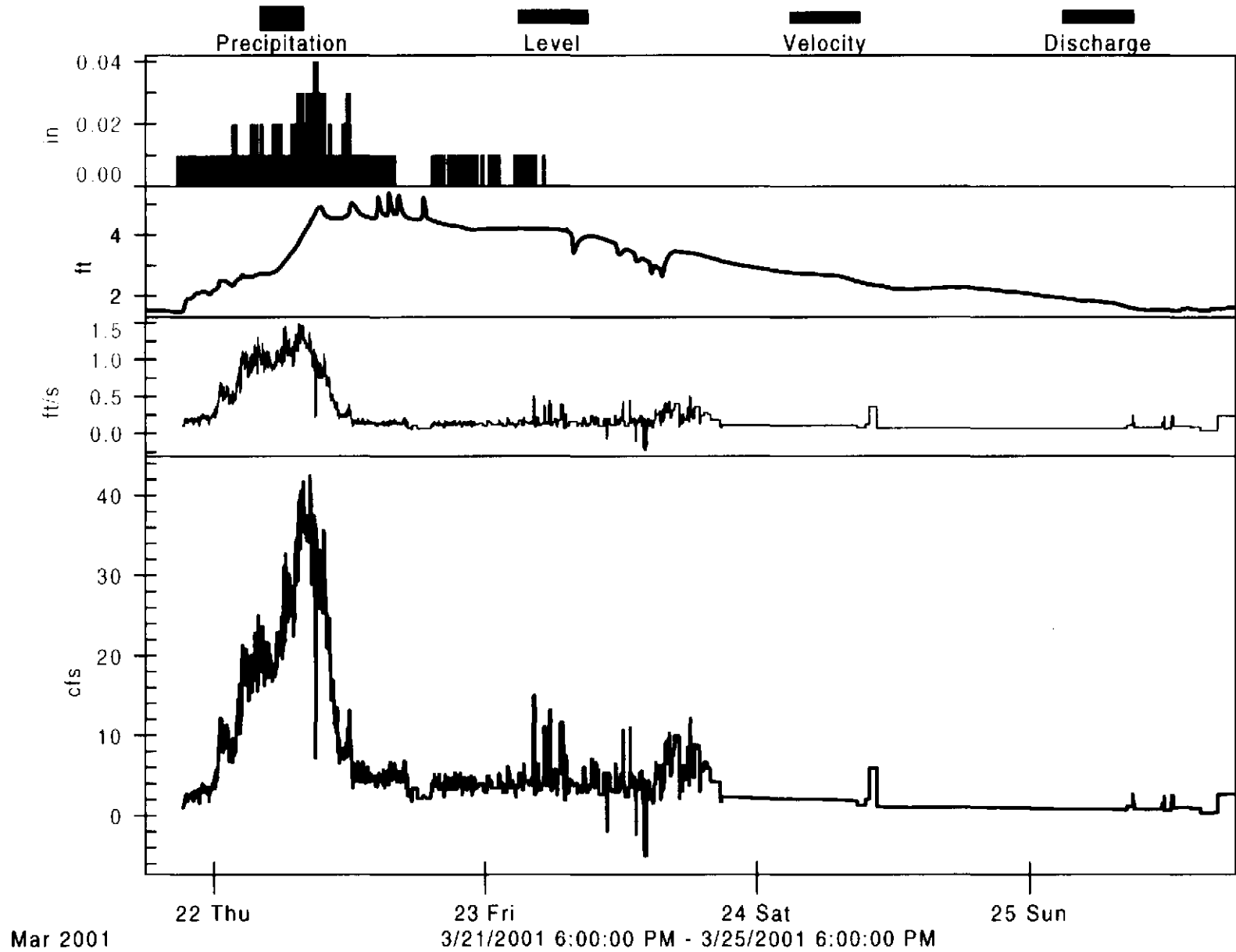
Original includes color coding.

SW-6 Spring Storm 1



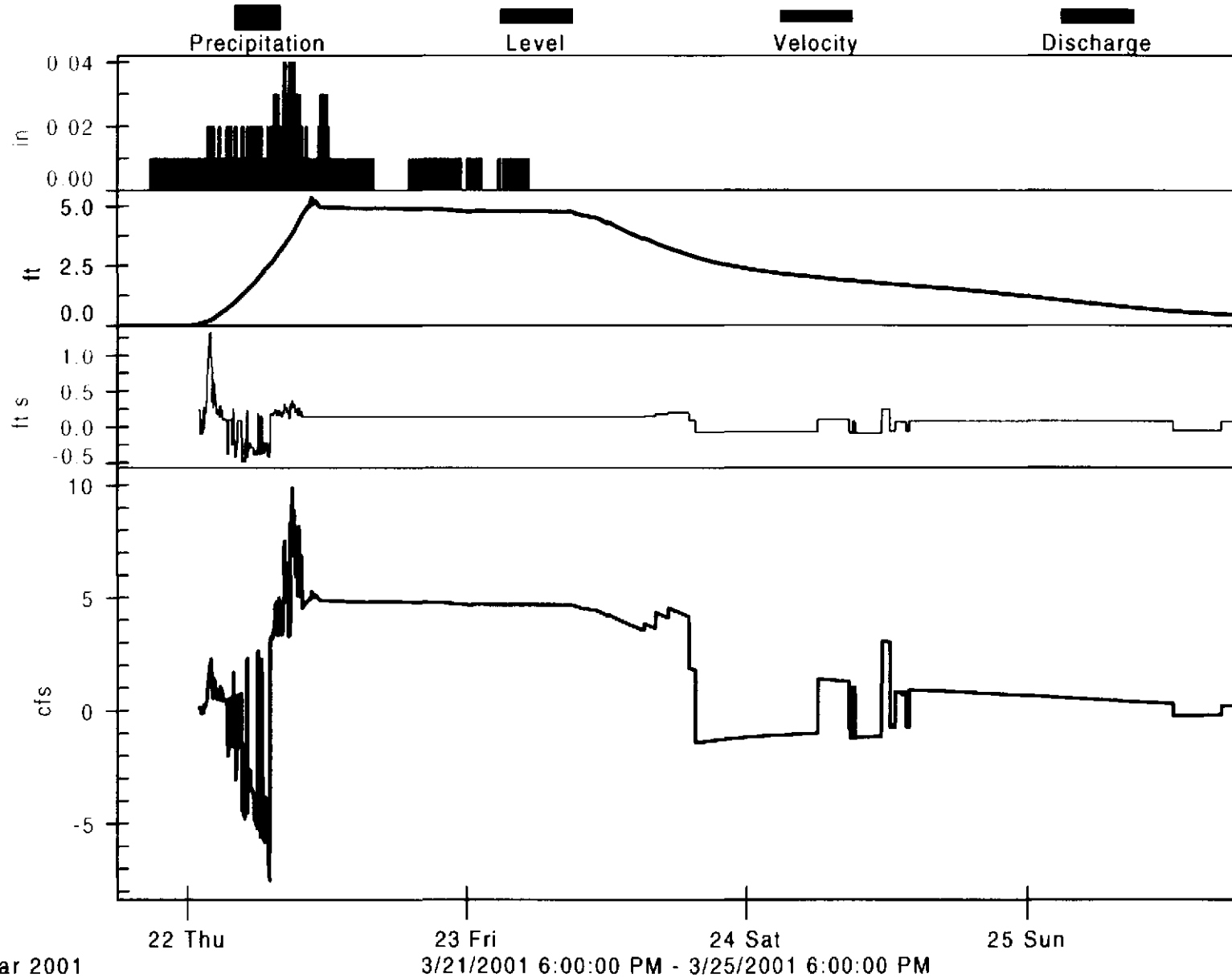
Original includes color coding.

SW-7 Spring Storm 1



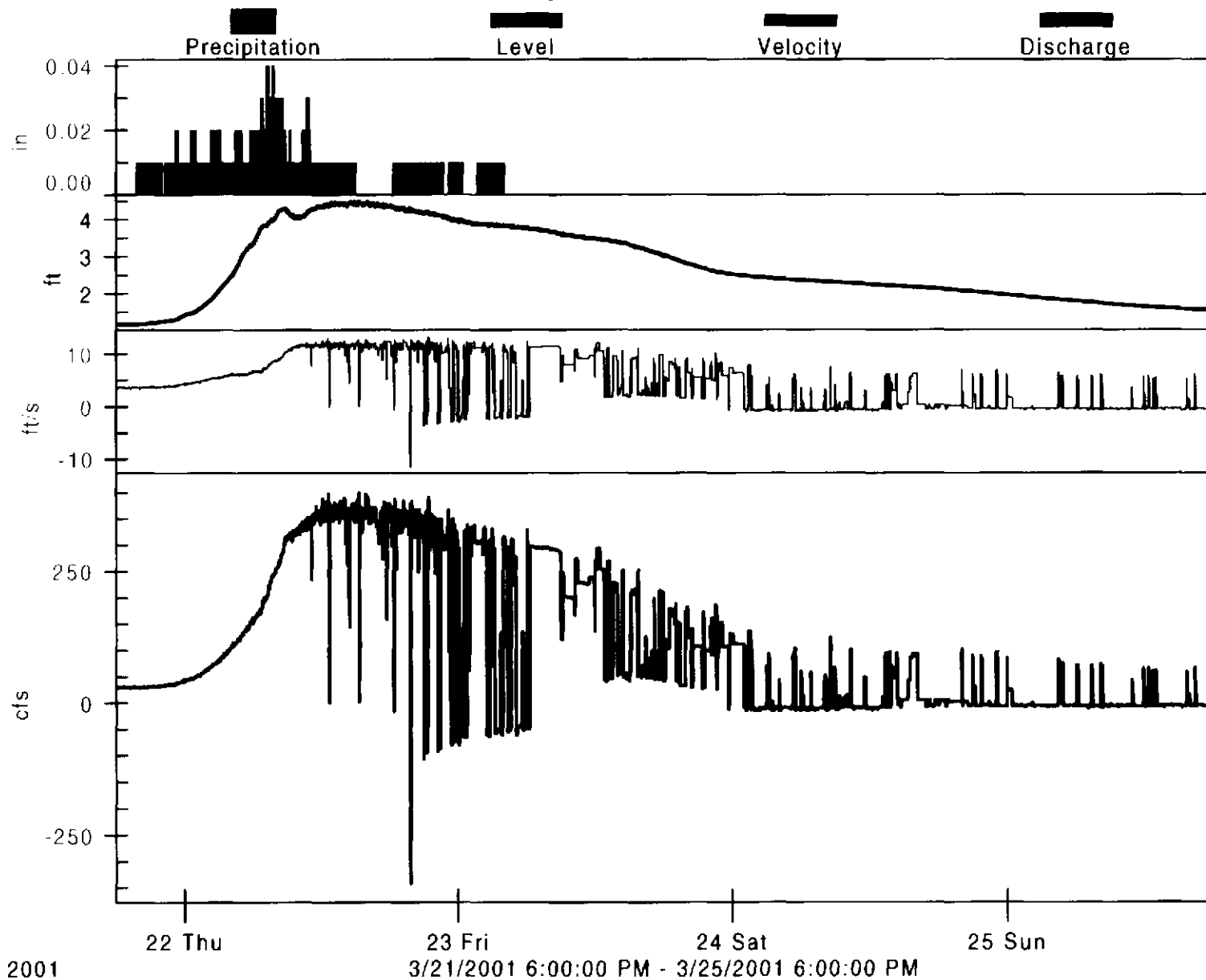
Original includes color coding.

SW-8 Spring Storm 1



Original includes color coding.

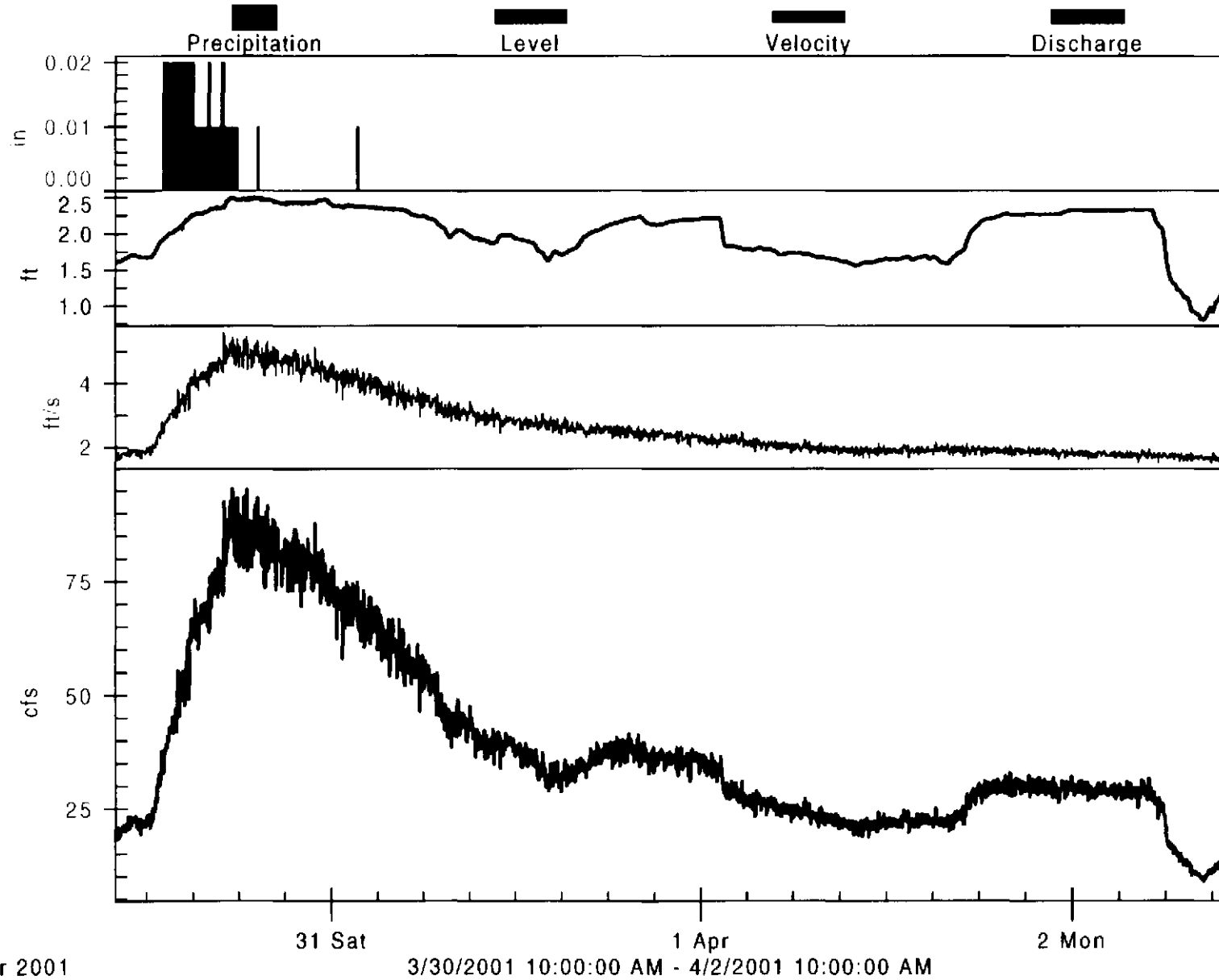
SW-9 Spring Storm 1



Original includes color coding.

Spring Storm 2A

SW-1 Spring Storm 2A

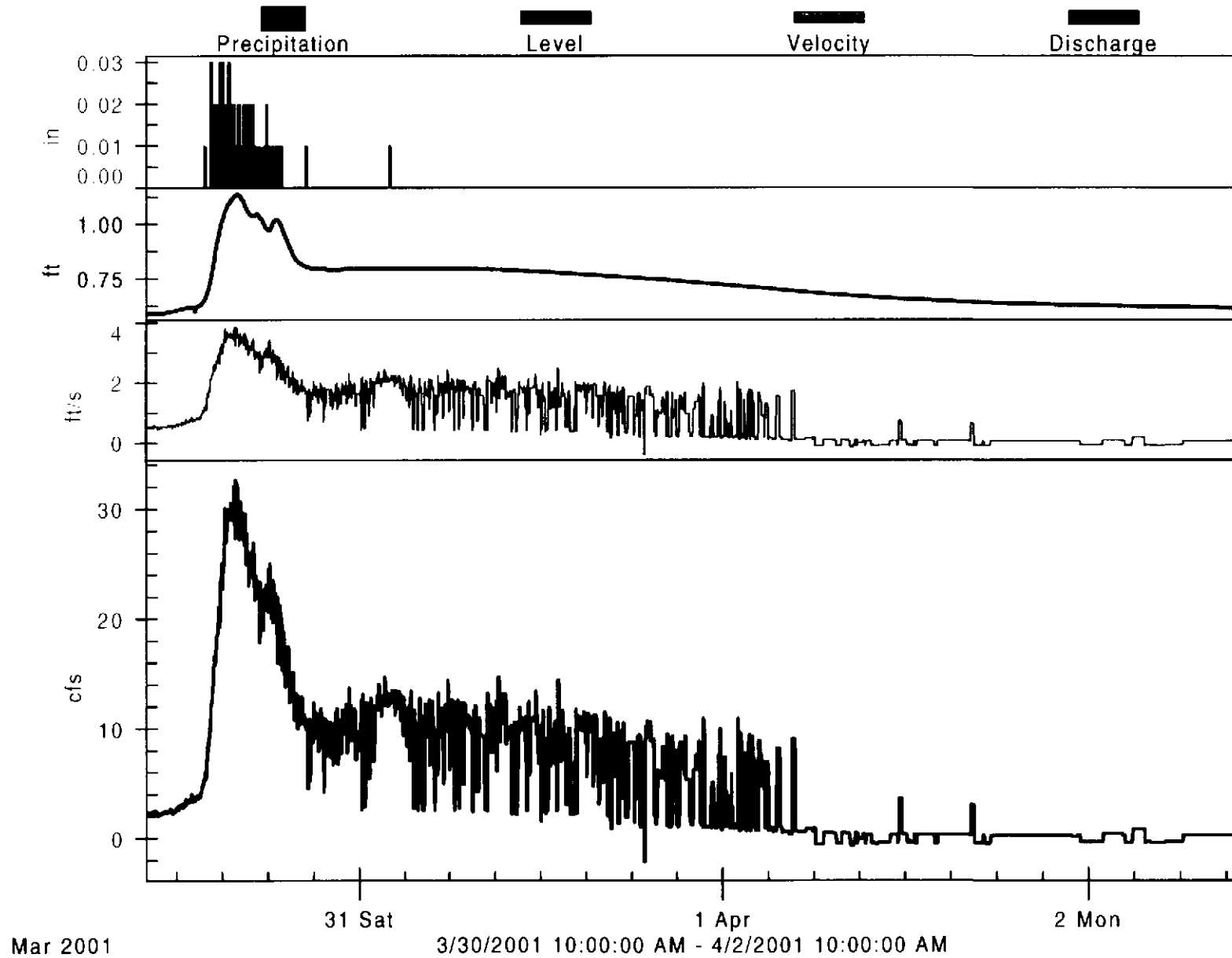


Mar 2001

3/30/2001 10:00:00 AM - 4/2/2001 10:00:00 AM

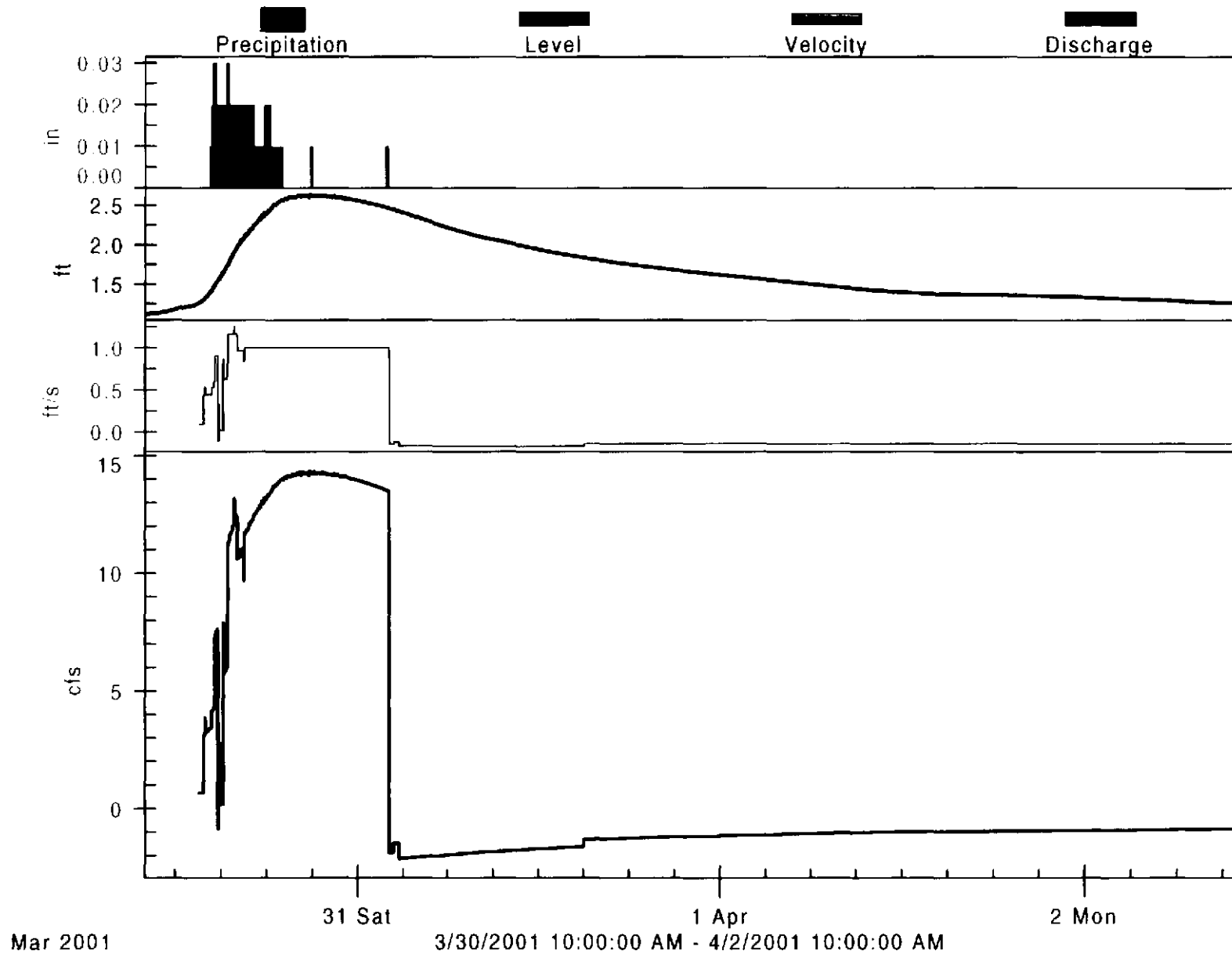
Original includes color coding.

SW-2 Spring Storm 2A



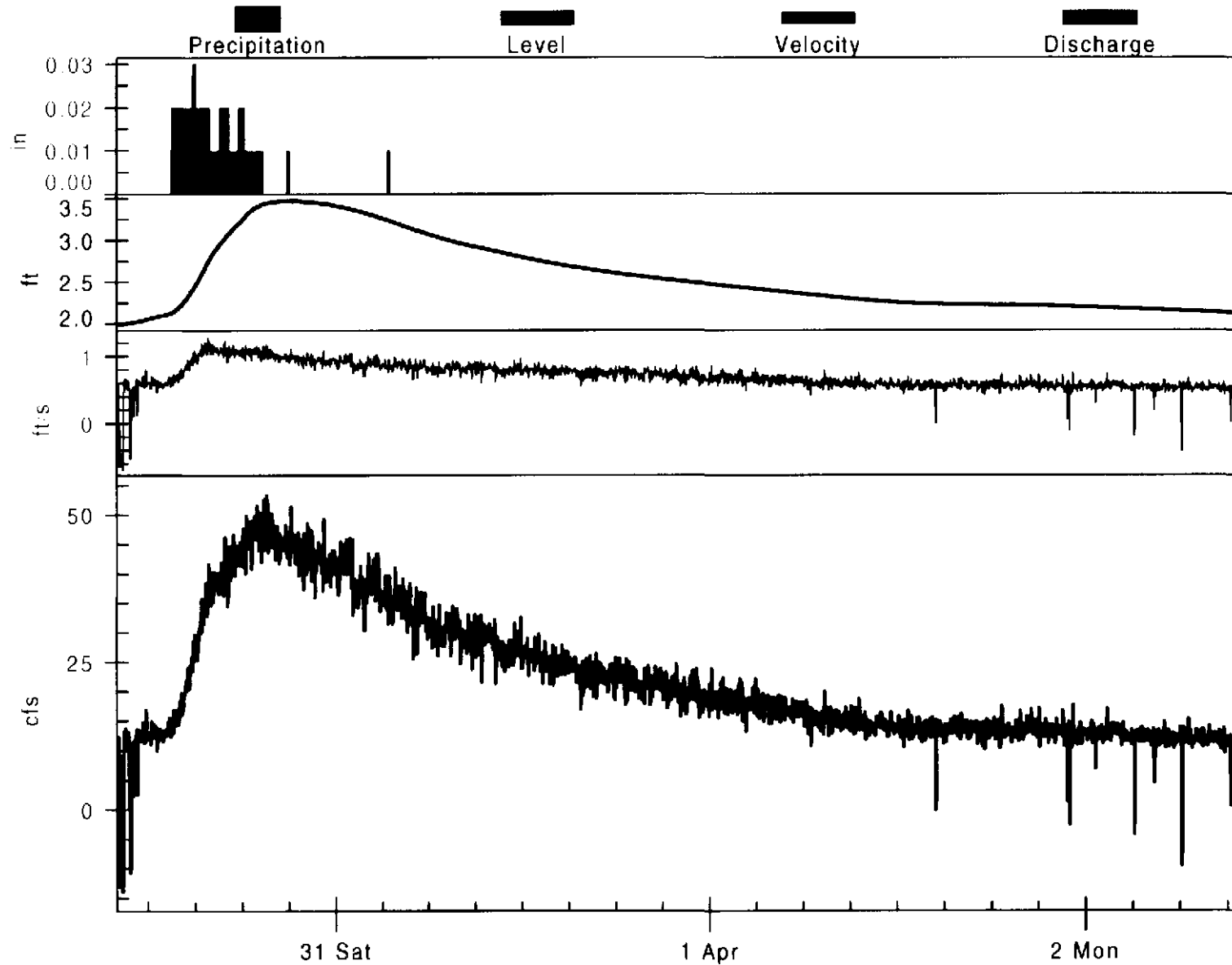
Original includes color coding.

SW-3 Spring Storm 2A



Original includes color coding.

SW-4 Spring Storm 2A

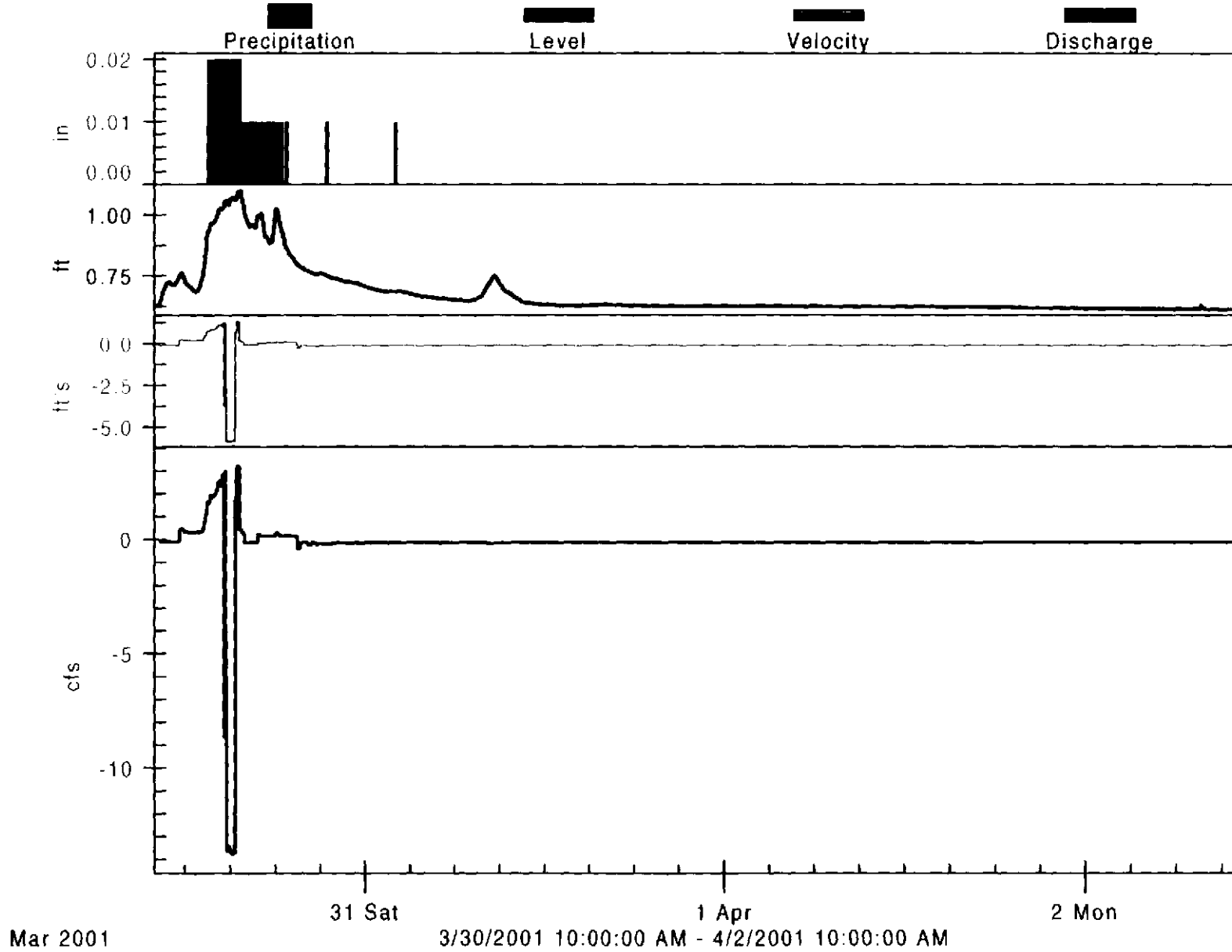


Mar 2001

3/30/2001 10:00:00 AM - 4/2/2001 10:00:00 AM

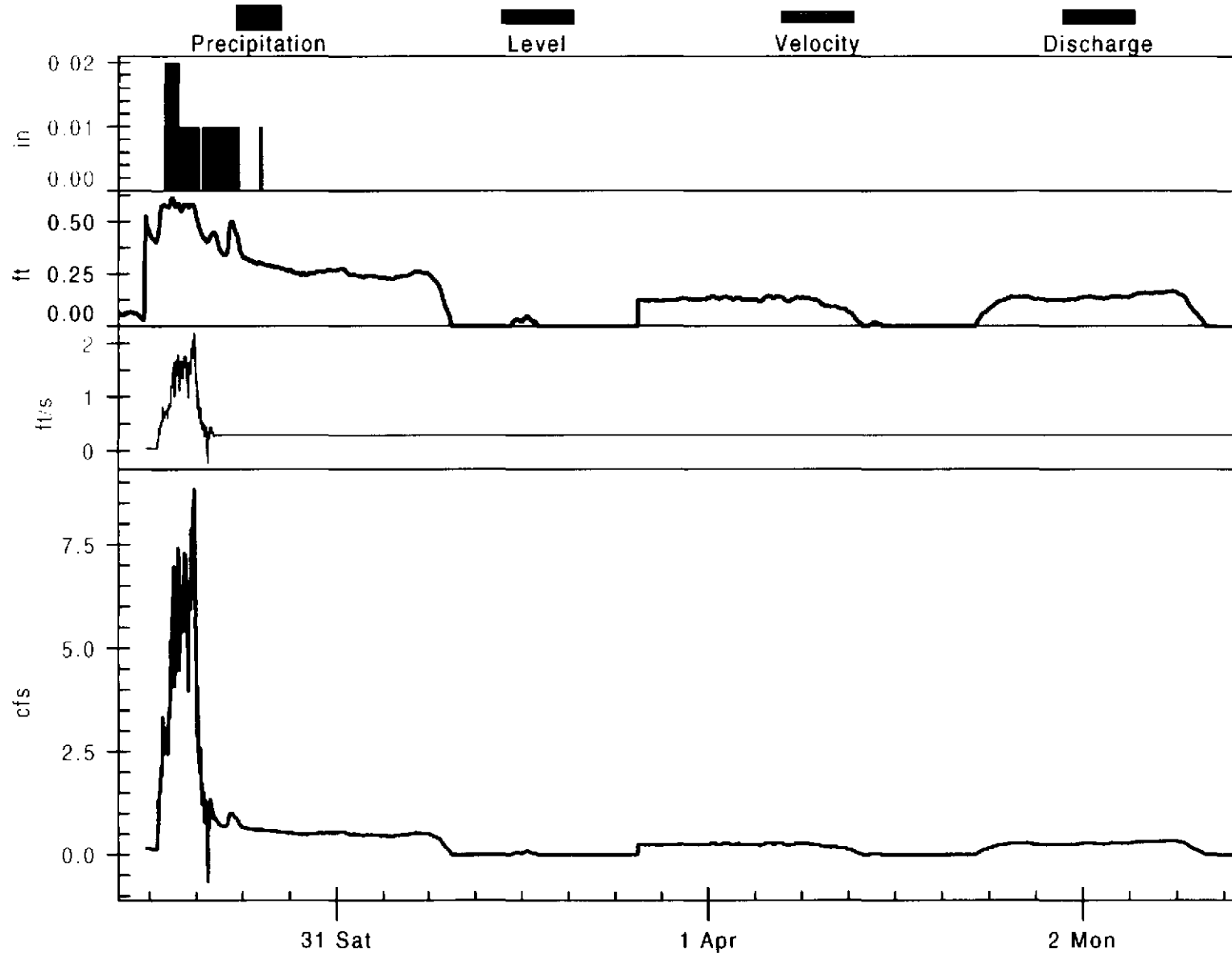
Original includes color coding.

SW-5 Spring Storm 2A



Original includes color coding.

SW-6 Spring Storm 2A

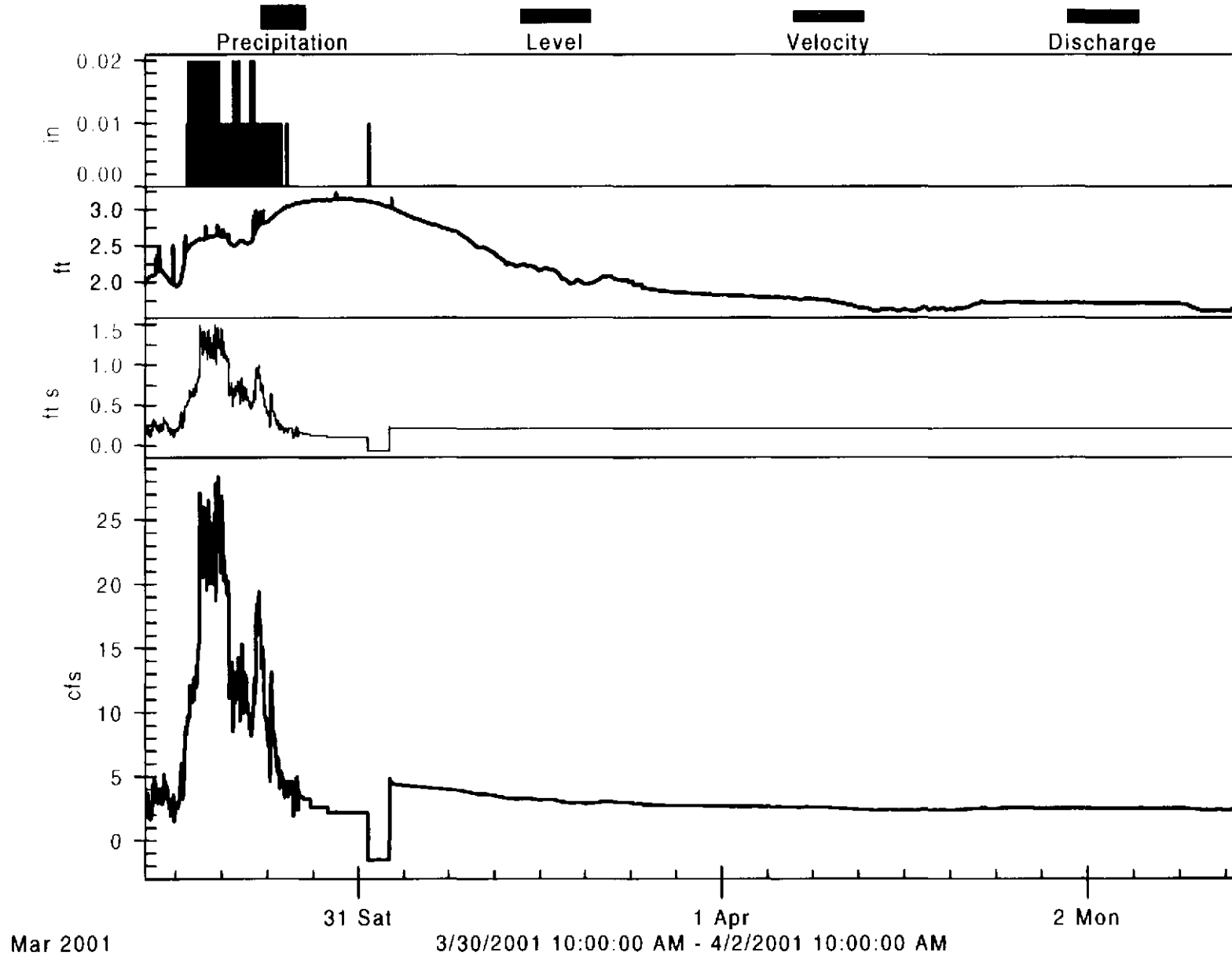


Mar 2001

3/30/2001 10:00:00 AM - 4/2/2001 10:00:00 AM

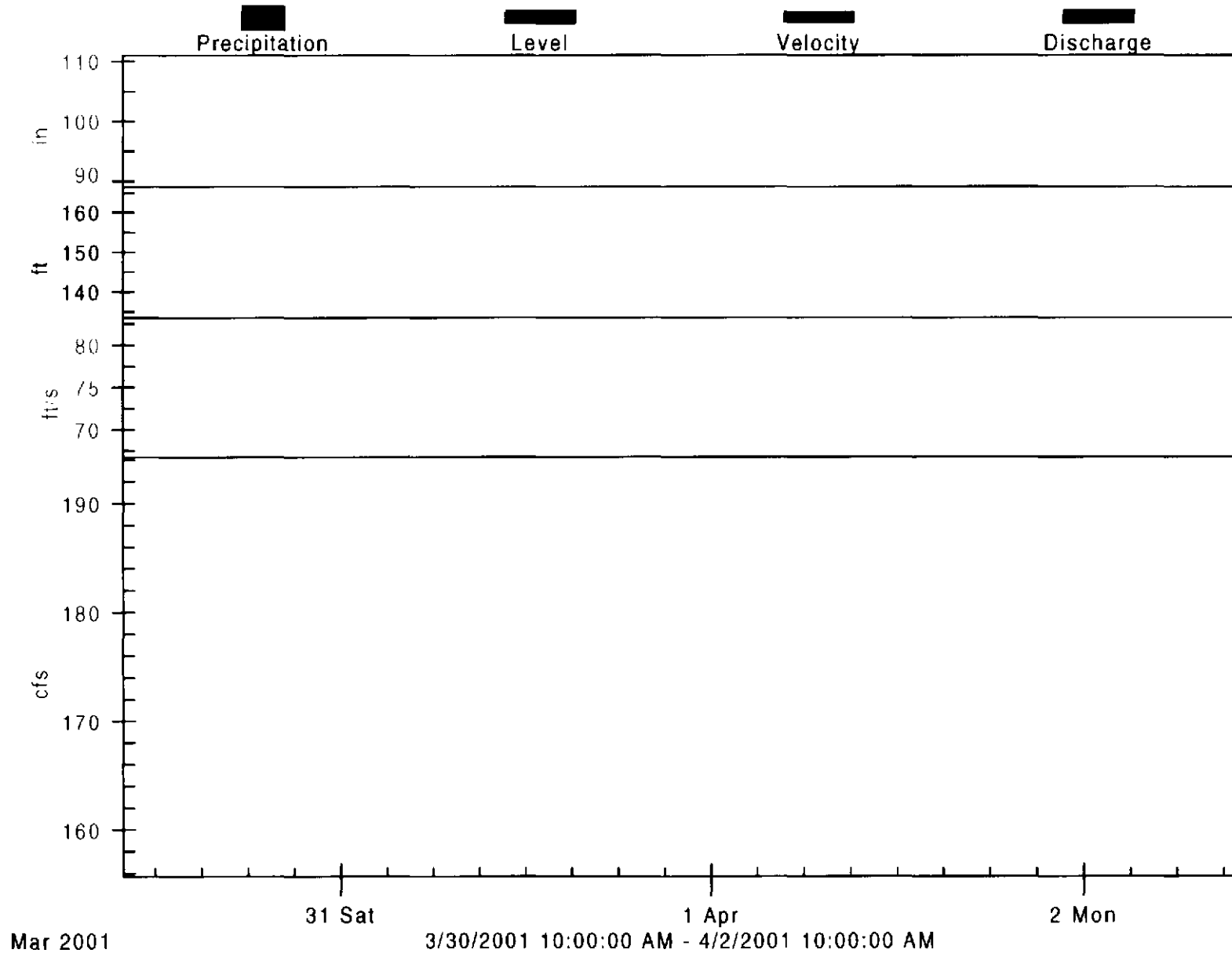
Original includes color coding.

SW-7 Spring Storm 2A



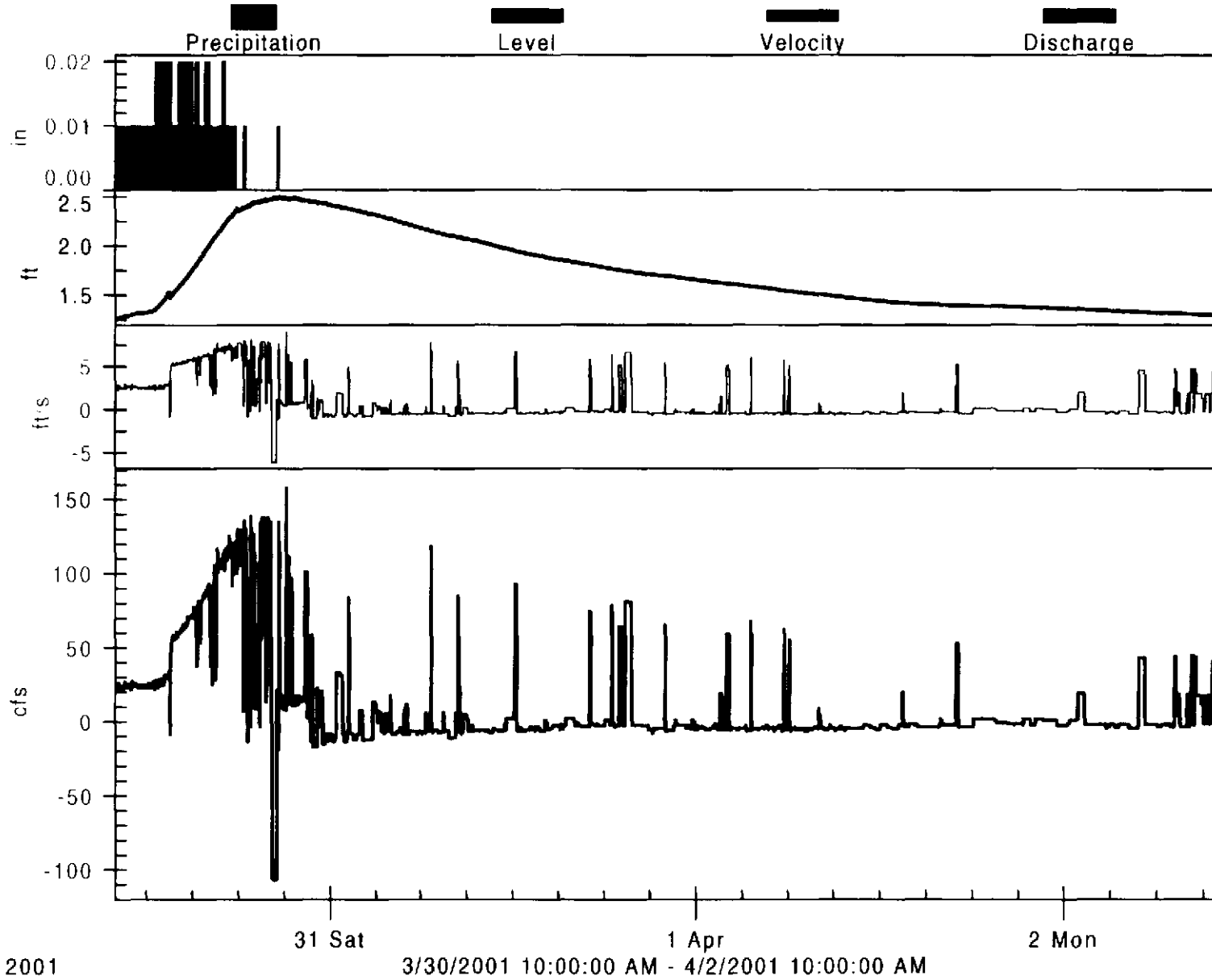
Original includes color coding.

SW-8 Spring Storm 2A - No Data



Original includes color coding.

SW-9 Spring Storm 2A



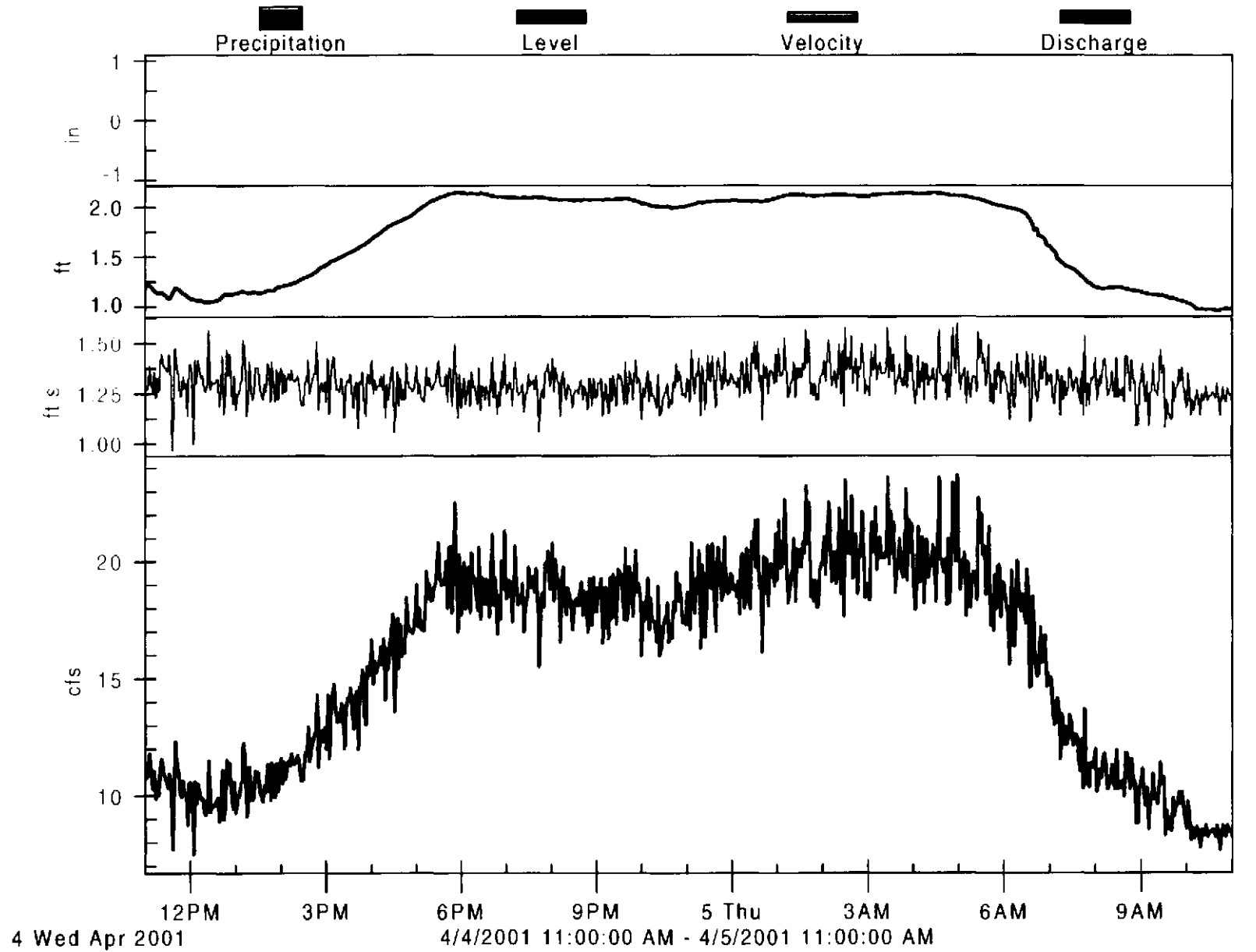
Mar 2001

3/30/2001 10:00:00 AM - 4/2/2001 10:00:00 AM

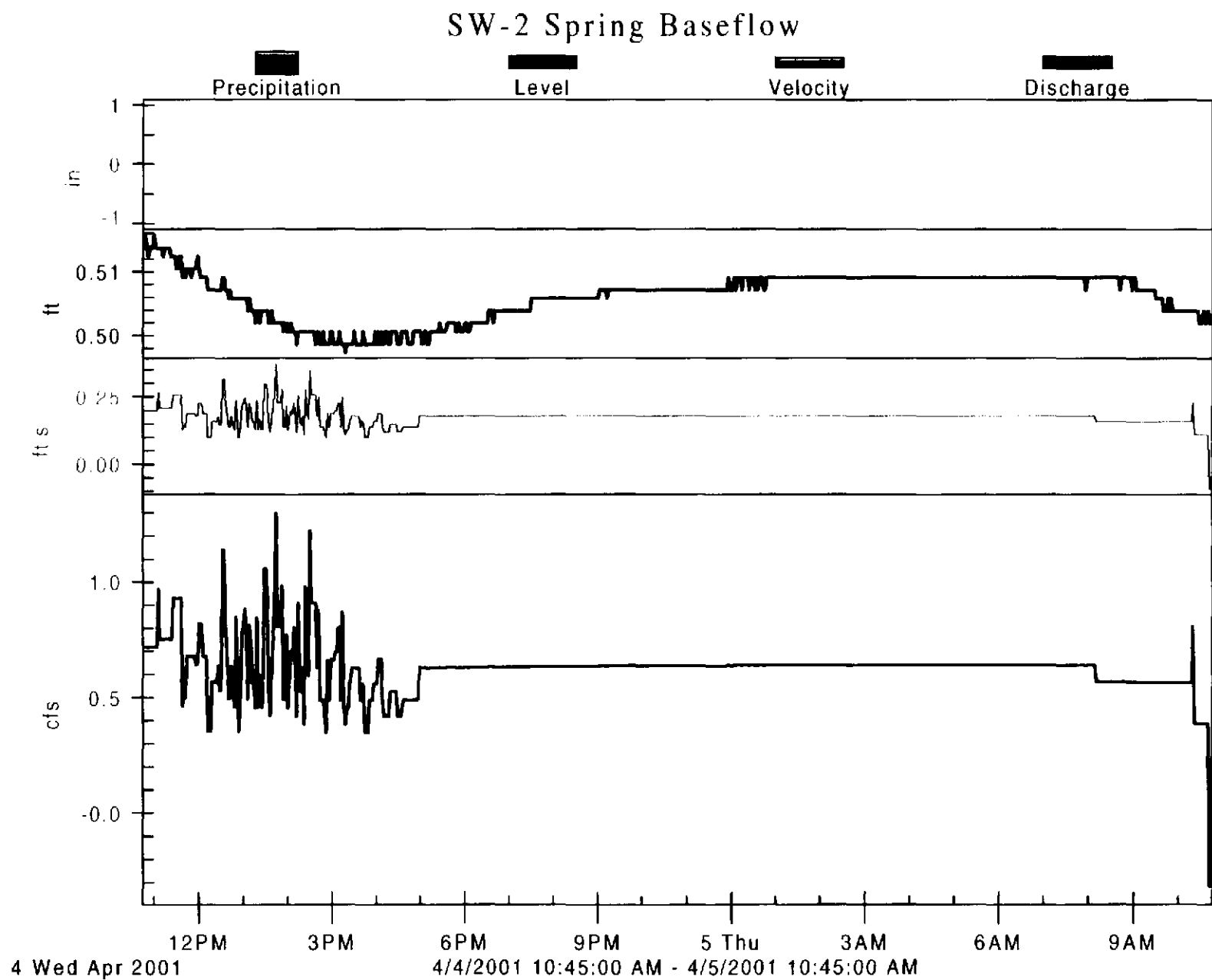
Original includes color coding.

Spring Baseflow

SW-1 Spring Baseflow

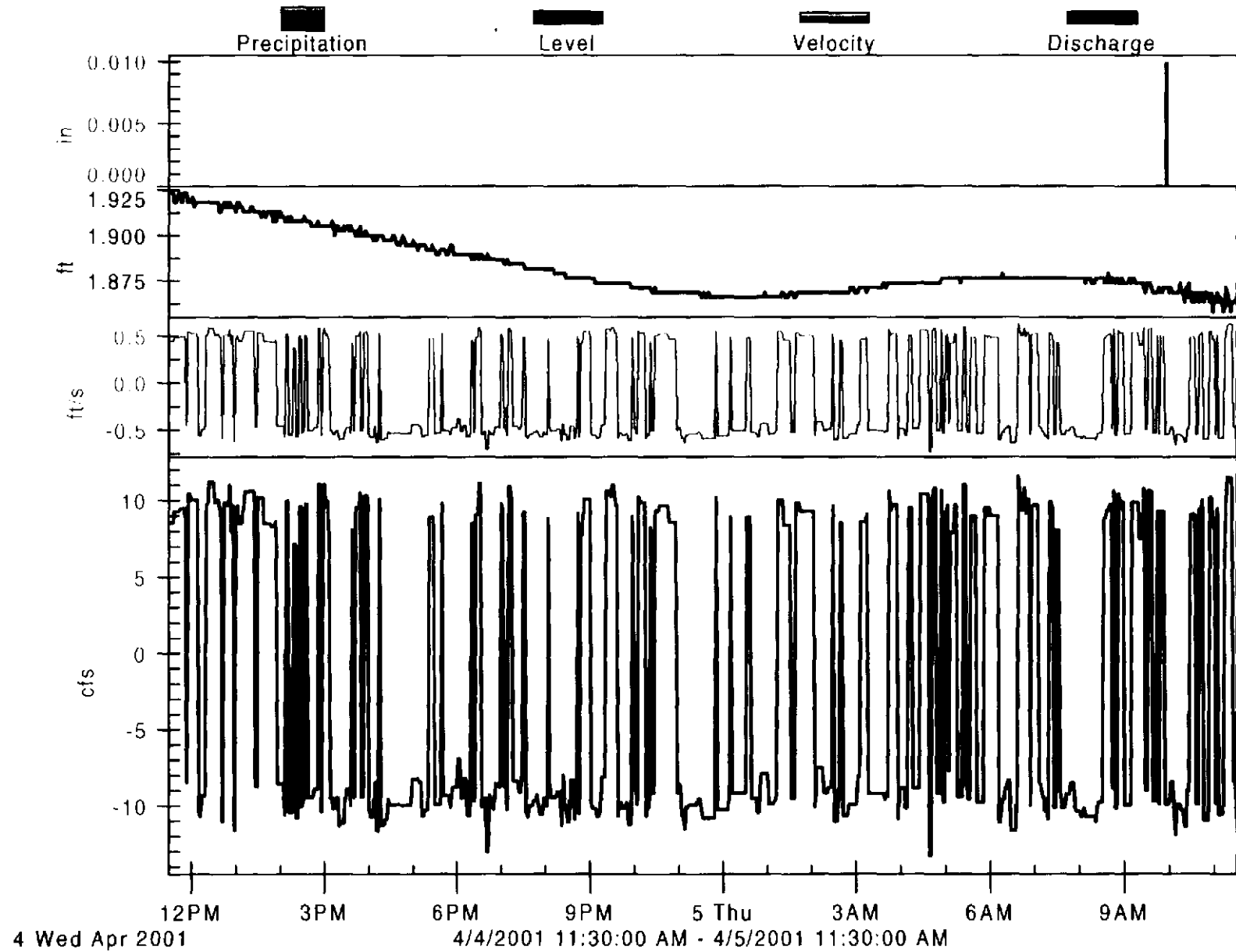


Original includes color coding.



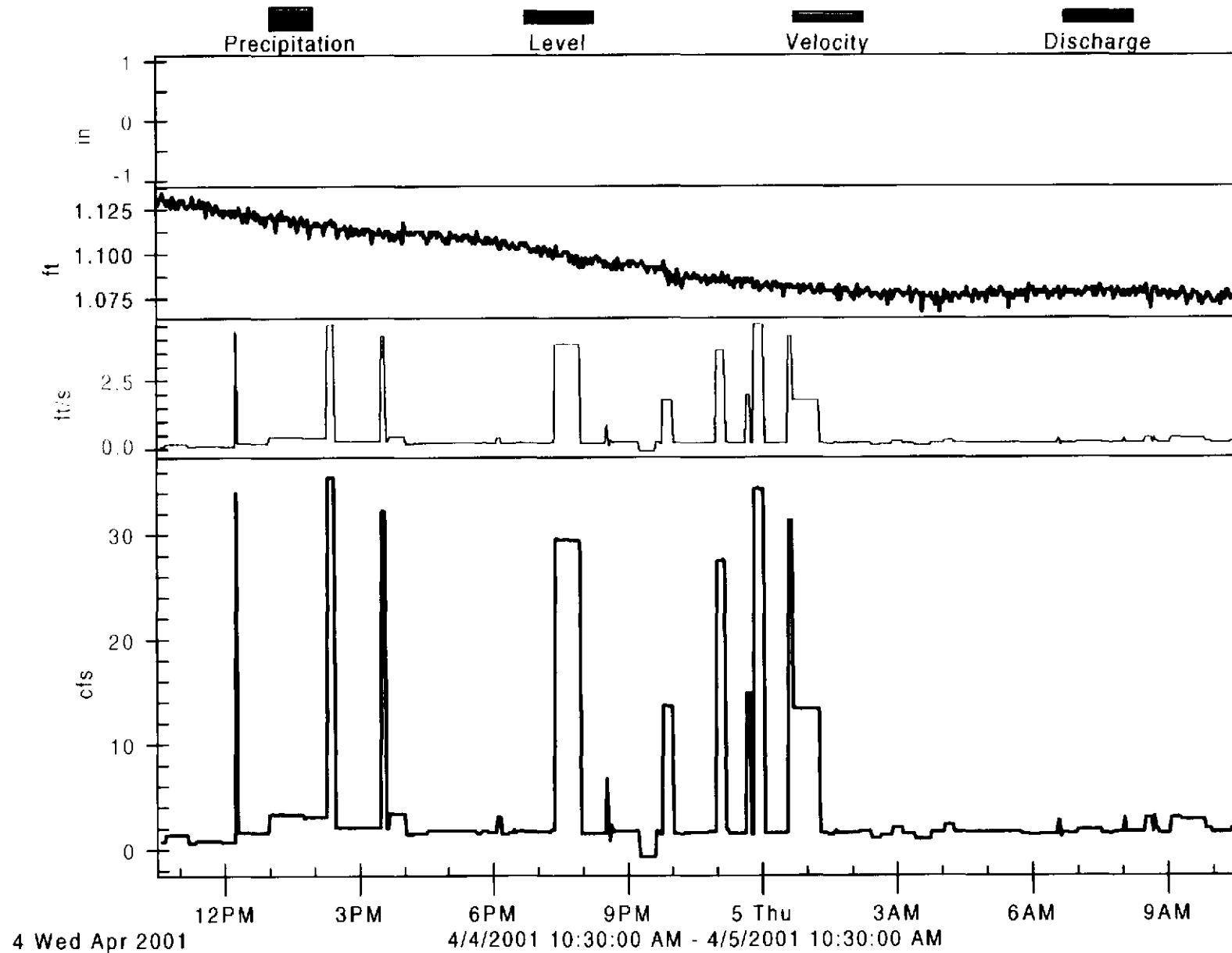
Original includes color coding.

SW-4 Spring Baseflow



Original includes color coding.

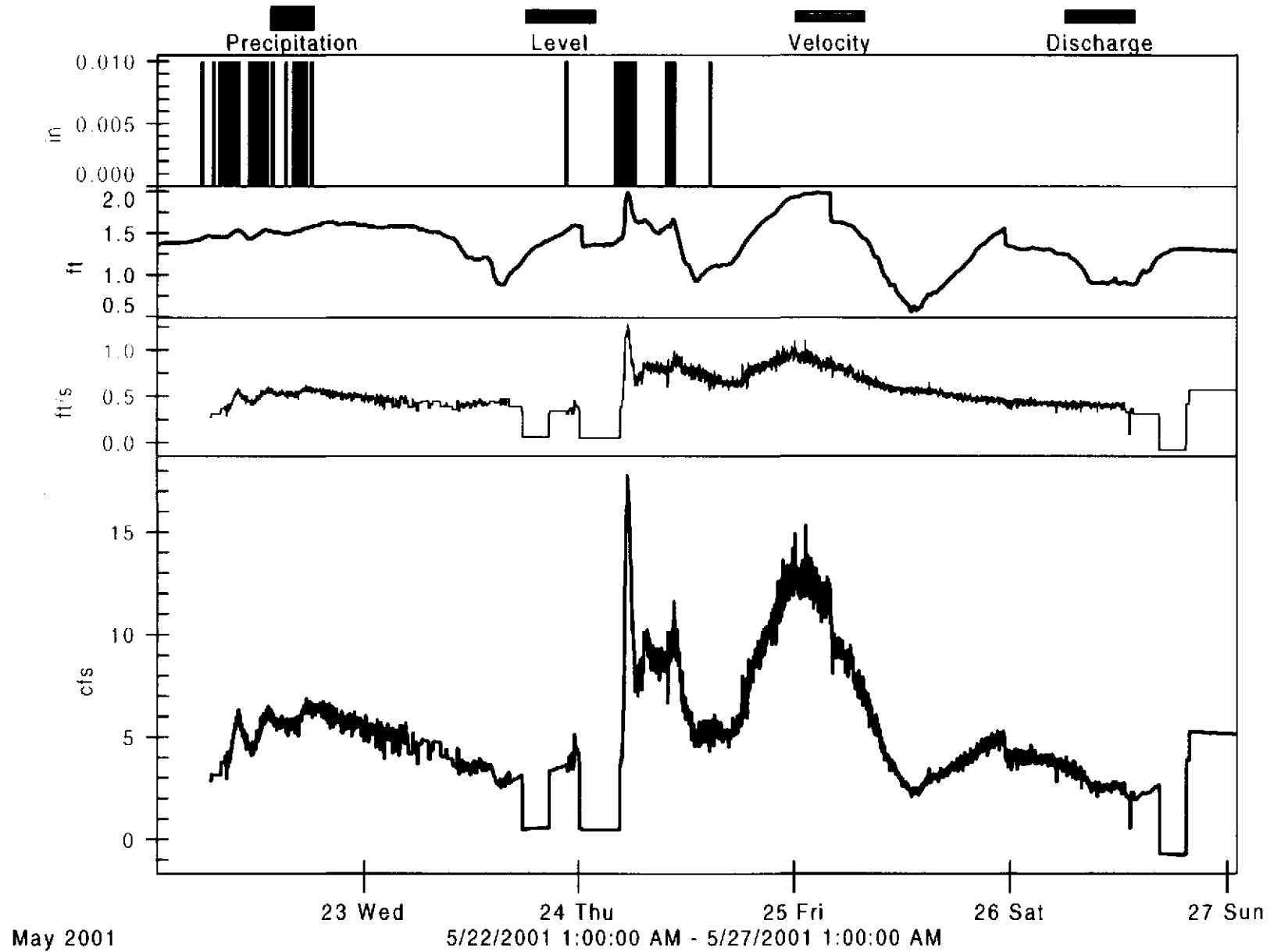
SW-9 Spring Baseflow



Original includes color coding.

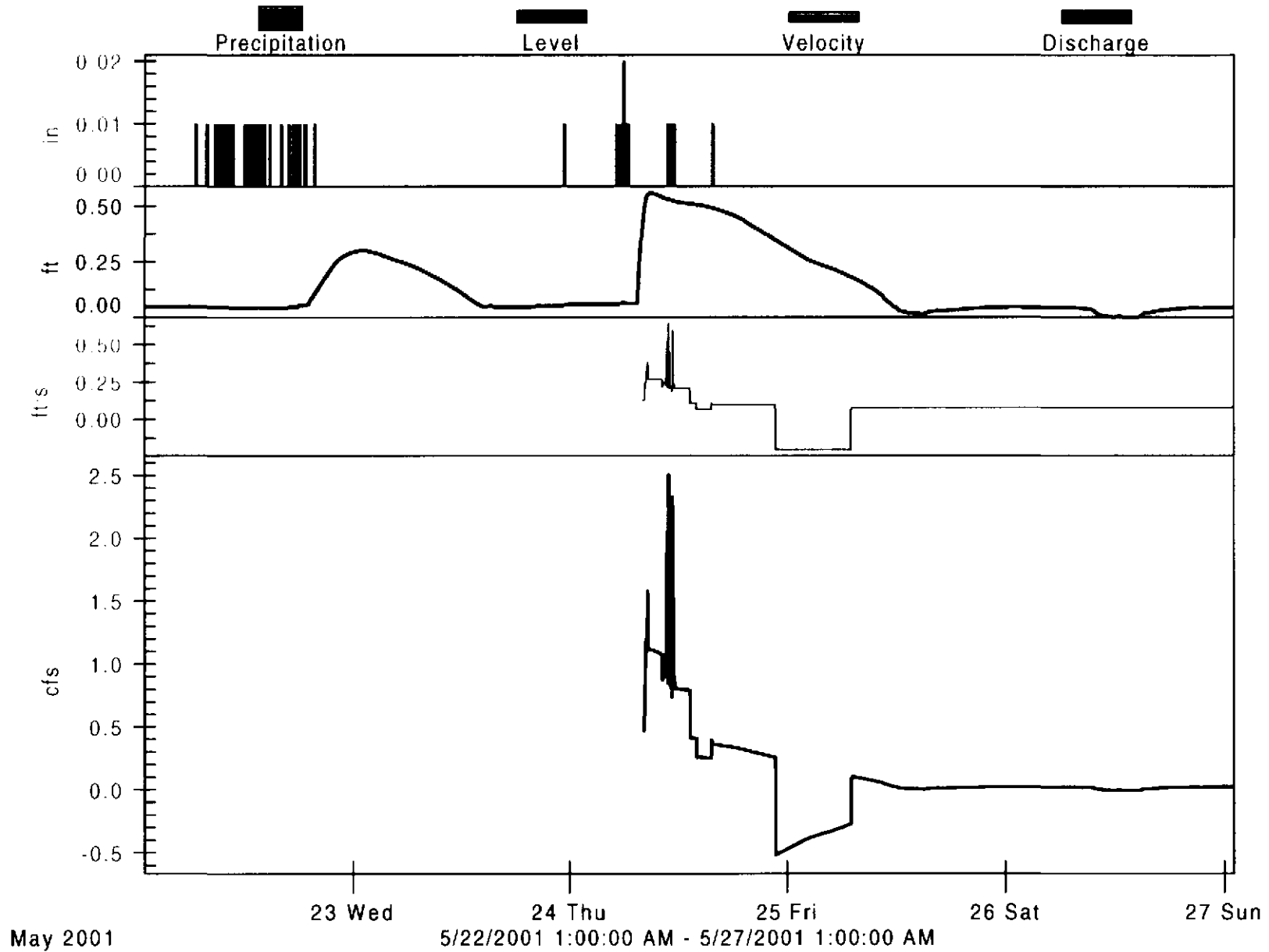
Spring Storm 2B

SW-1 Spring Storm 2B



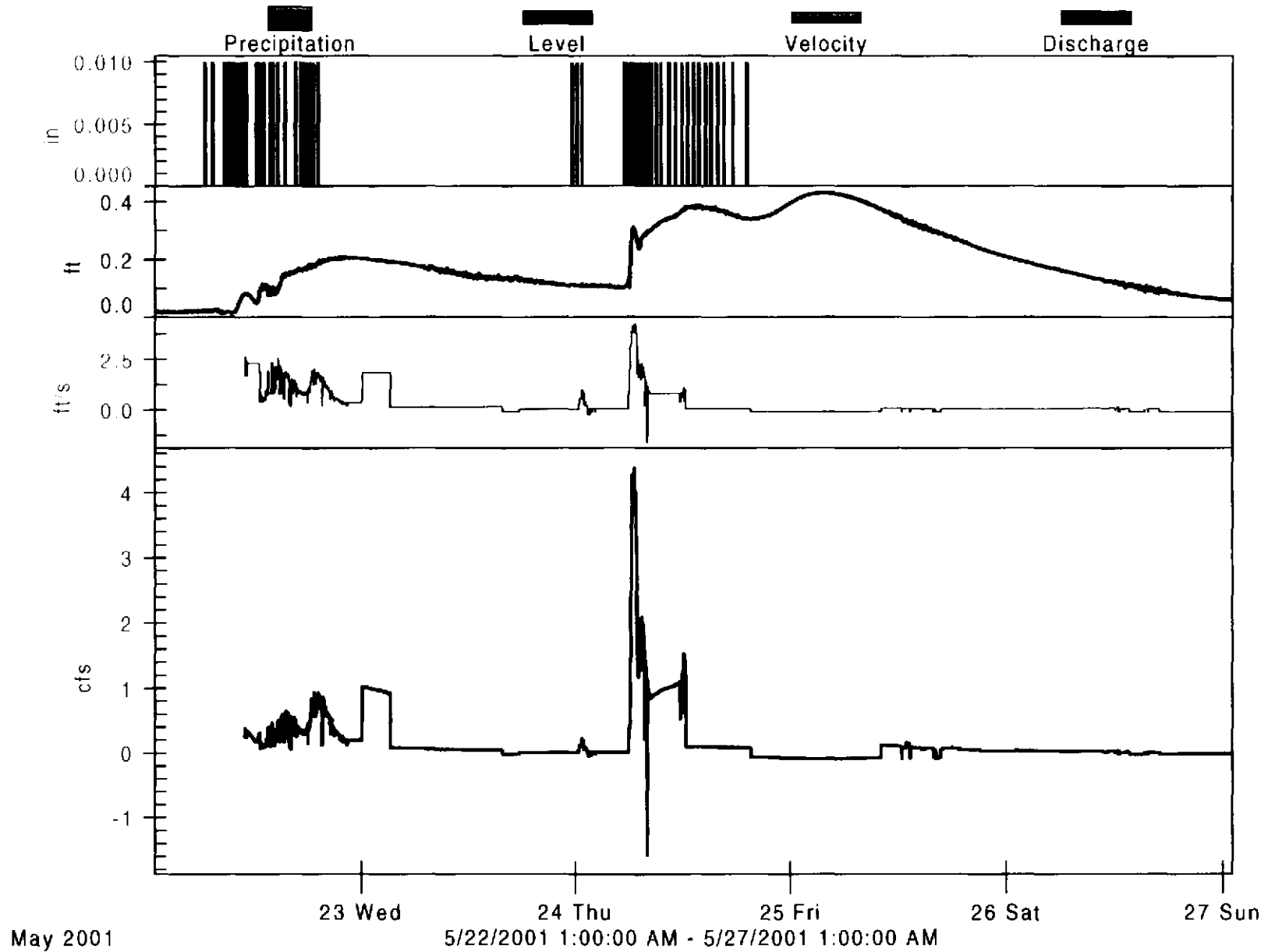
Original includes color coding.

SW-2 Spring Storm 2B



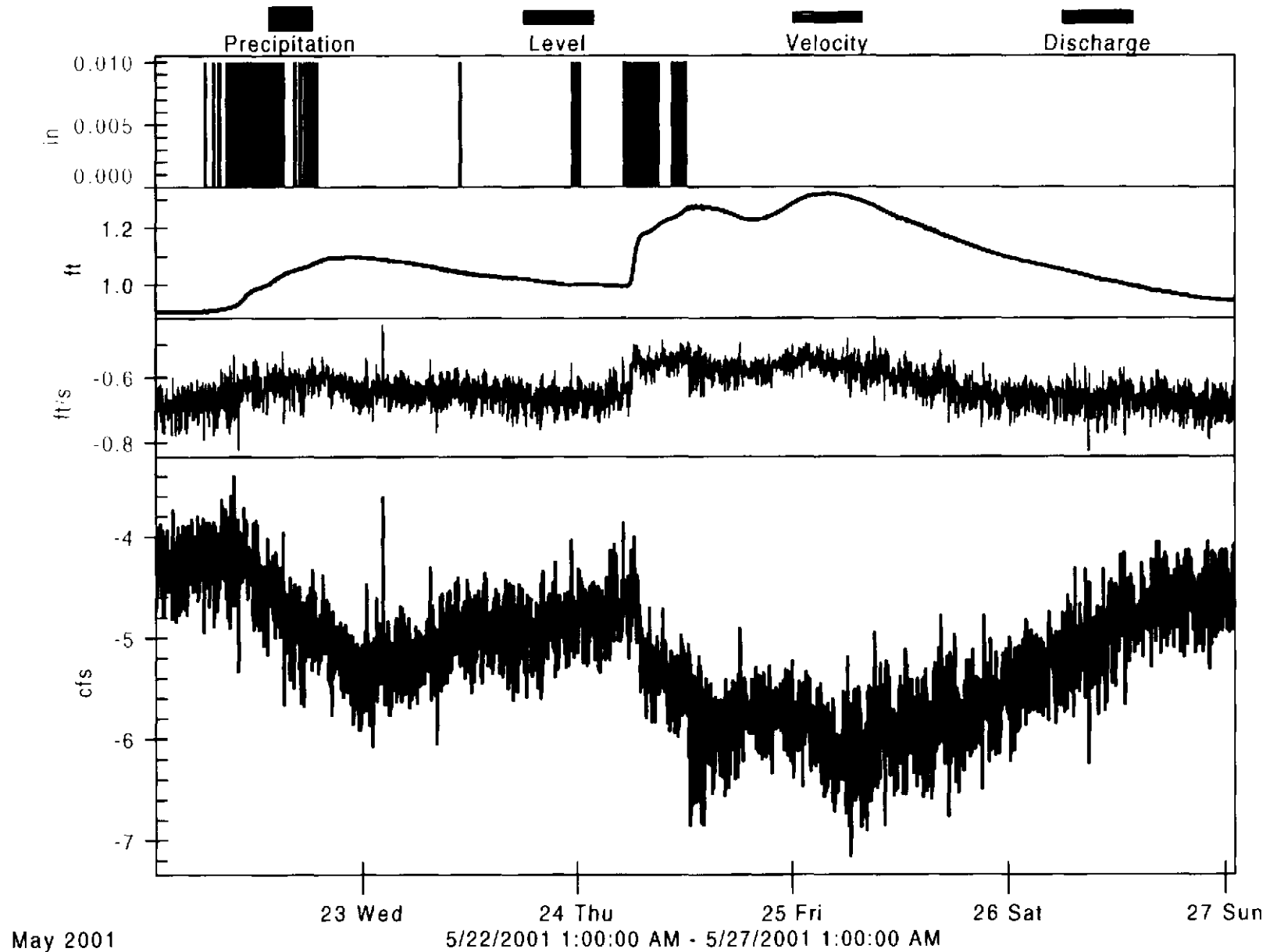
Original includes color coding.

SW-3 Spring Storm 2B



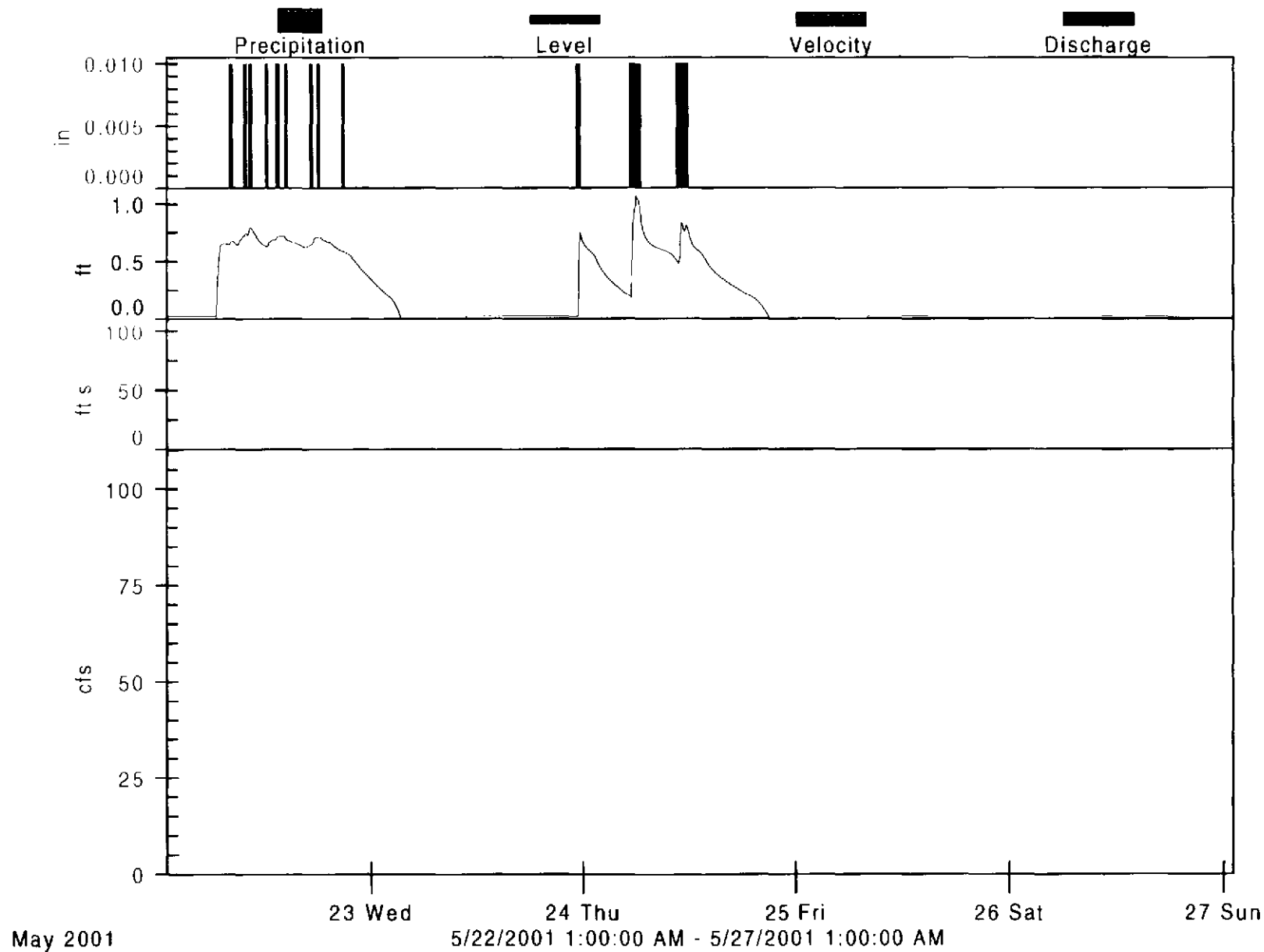
Original includes color coding.

SW-4 Spring Storm 2B



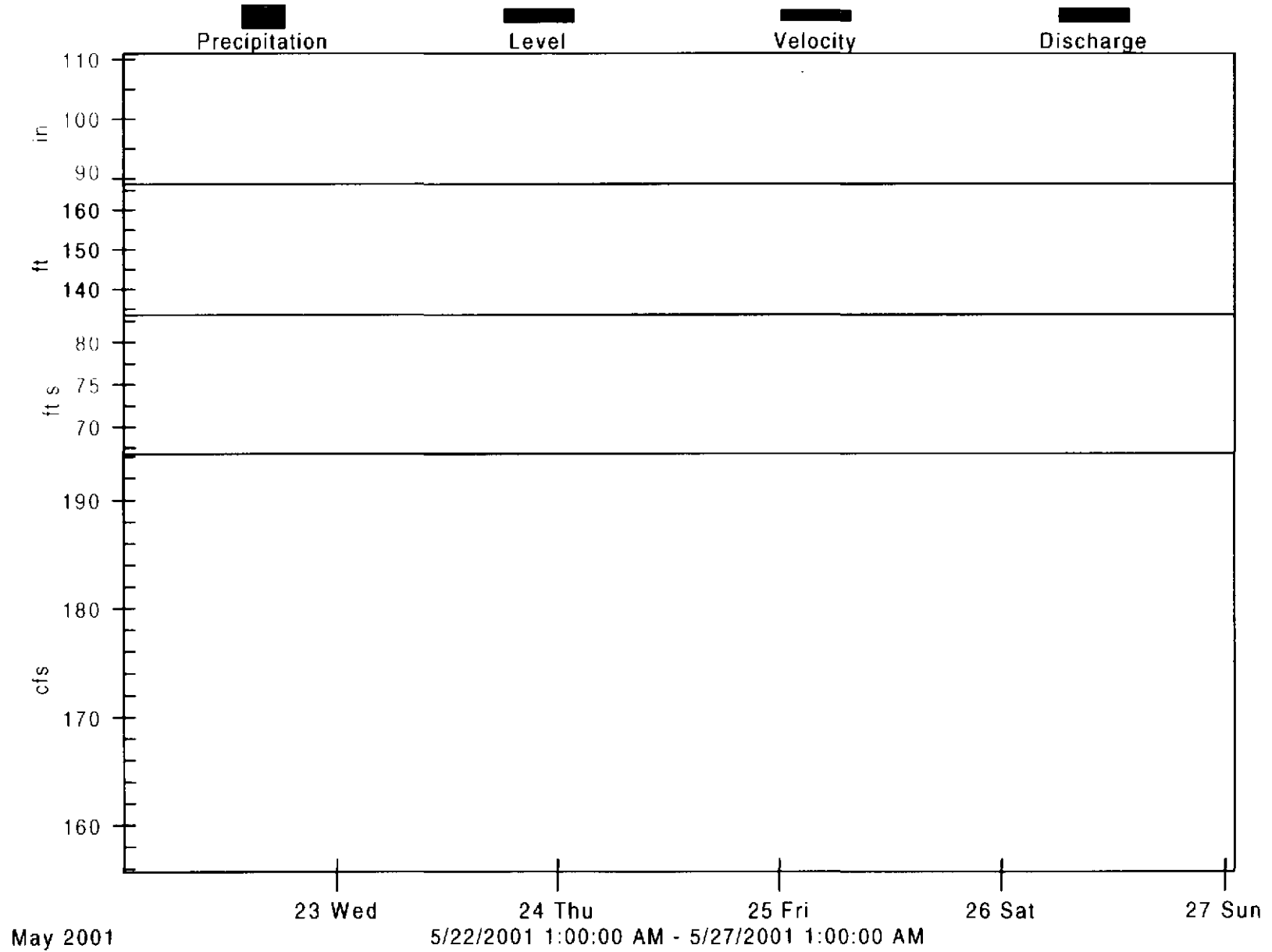
Original includes color coding.

SW-5 Spring Storm 2B



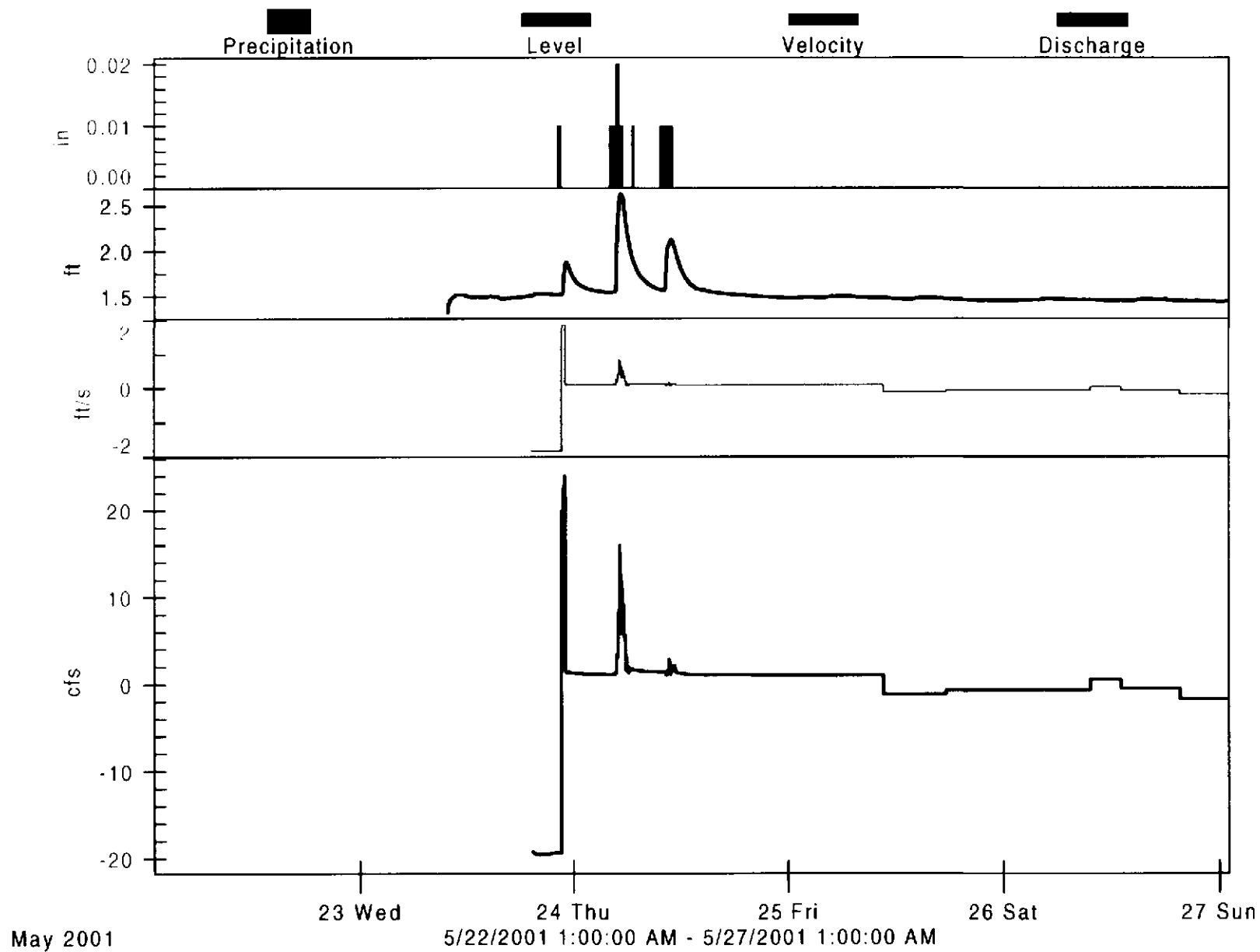
Original includes color coding.

SW-6 Spring Storm 2B - No Data



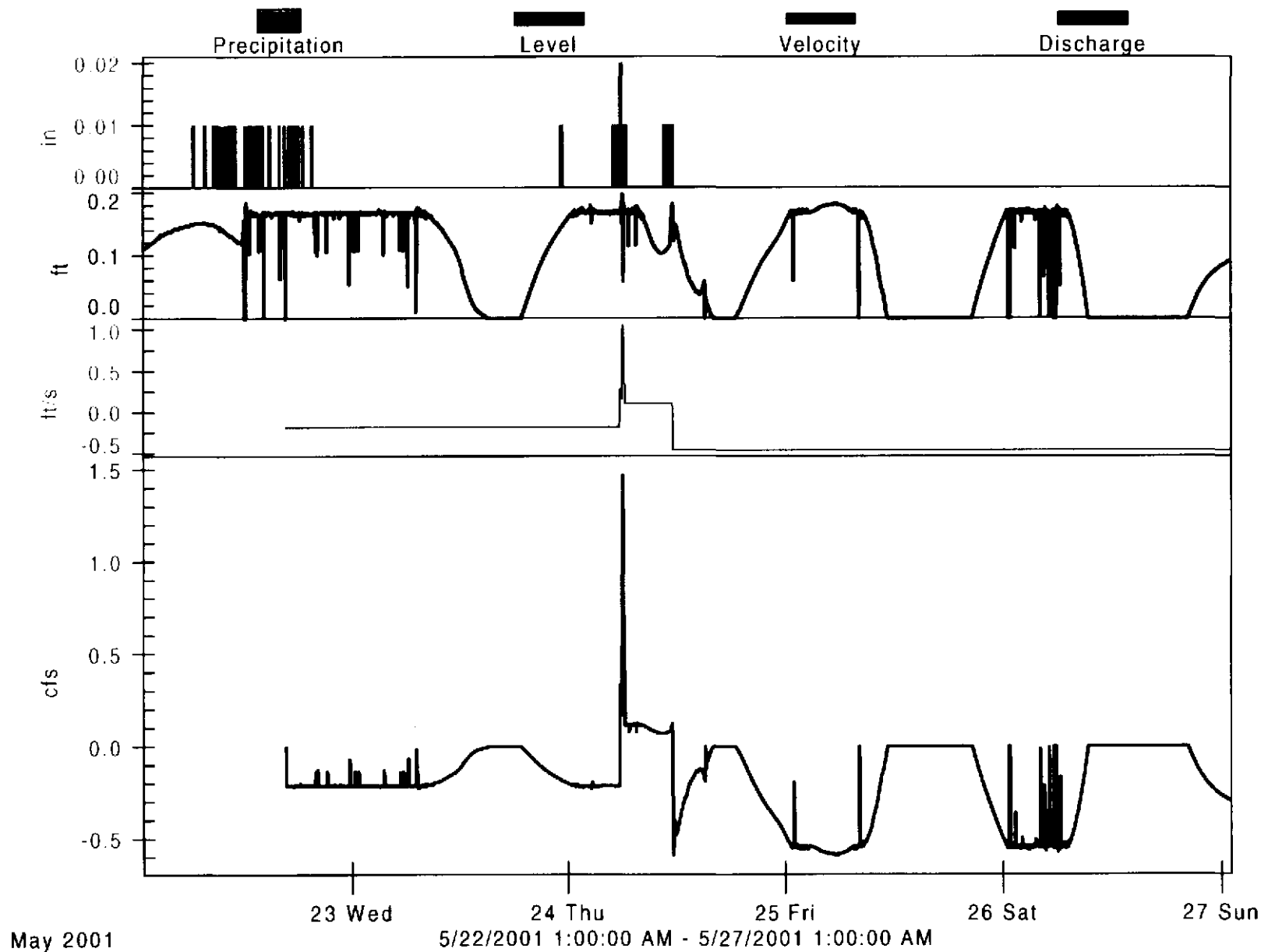
Original includes color coding.

SW-7 Spring Storm 2B



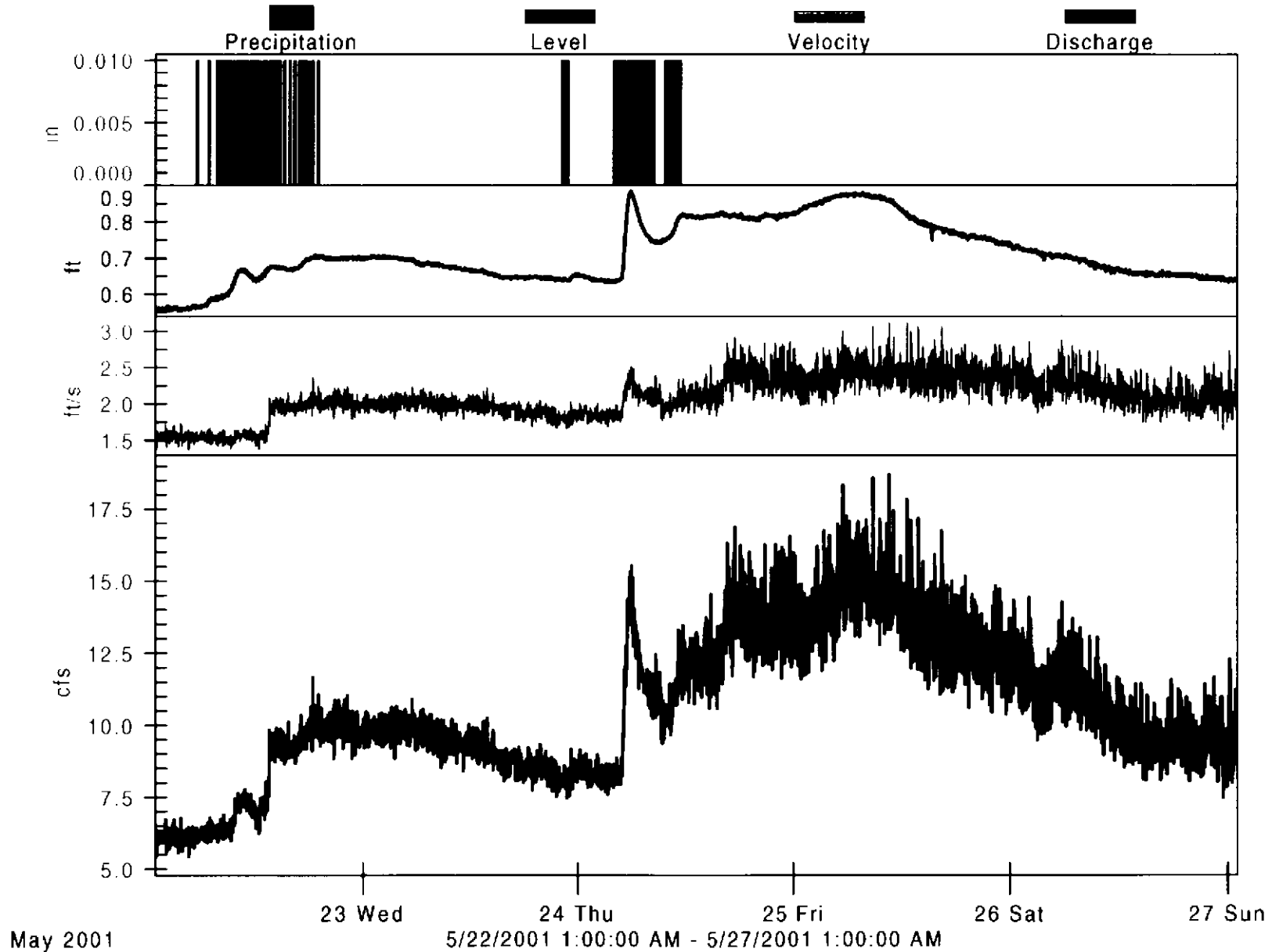
Original includes color coding.

SW-8 Spring Storm 2B



Original includes color coding.

SW-9 Spring Storm 2B



Original includes color coding.

APPENDIX I

Discharge Measurements

Stream Gauge Location	SW-1	Project	Solutia
Date	8/30/00	Project Number	06626M32
Time	1653		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 85 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
South End	0.6	1	0.6	0.04	0.024	10.77264
1	0.7	1	0.7	0.04	0.028	12.56808
2	0.7	1	0.7	0.03	0.021	9.42606
3	0.45	1	0.45	0.06	0.027	12.11922
4	0.45	1	0.45	0.06	0.027	12.11922
5	0.6	1	0.6	0.04	0.024	10.77264
6	0.6	1	0.6	0.05	0.03	13.4658
North End	0.6	1	0.05	0.01	0.0005	0.22443
Total Discharge Rate:					0.1815	81.46809

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project	Solutia
Date	9/19/00	Project Number	06626M32
Time	1445		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 70 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.7	1	0.7	0.17	0.119	53.41434
1	0.8	1	0.8	0.22	0.176	78.99936
2	0.6	1	0.6	0.17	0.102	45.78372
3	0.6	1	0.6	0.23	0.138	61.94268
4	0.75	1	0.75	0.23	0.1725	77.42835
5	0.7	1	0.7	0.21	0.147	65.98242
6	0.7	1	0.7	0.2	0.14	62.8404
7	0.7	1	0.7	-0.04	-0.028	-12.56808
Total Discharge Rate:					0.9665	433.82319

Notes:

Depth = Depth of water at the segment midpoint
 Length = Width of segment
 Area = Area of segment (Depth x Length)
 1 ft³ = 7.481 gallons
 ft = feet
 sec = second
 gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project	Solutia
Date	10/4/00	Project Number	06626M32
Time	1230		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 70 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.5	1	0.5	0.11	0.055	24.6873
1	0.65	1	0.65	0.15	0.0975	43.76385
2	0.55	1	0.55	0.12	0.066	29.62476
3	0.45	1	0.45	0.22	0.099	44.43714
4	0.45	1	0.45	0.22	0.099	44.43714
5	0.6	1	0.6	0.16	0.096	43.09056
6	0.6	1	0.6	0.08	0.048	21.54528
7	0.6	0.7	0.42	-0.03	-0.0126	-5.655636
Total Discharge Rate:					0.5479	245.930394

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project	Solutia
Date	10/19/00	Project Number	06626M32
Time	1315		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	1.3	1	1.3	0.78	1.014	455.14404
1	1.4	1	1.4	1.06	1.484	666.10824
2	1.4	1	1.4	0.73	1.022	458.73492
3	1.25	1	1.25	0.99	1.2375	555.46425
4	1.25	1	1.25	1.29	1.6125	723.78675
5	1.4	1	1.4	1.43	2.002	898.61772
6	1.4	1	1.4	1.24	1.736	779.22096
7	1.45	1	1.45	0.63	0.9135	410.03361
Total Discharge Rate:					11.0215	4947.11049

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project	Solutia
Date	11/10/00	Project Number	06626M32
Time	1115		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.65	1	0.65	-0.07	-0.0455	-20.42313
1	0.65	1	0.65	0.23	0.1495	67.10457
2	0.65	1	0.65	1.13	0.7345	329.68767
3	0.7	1	0.7	1.2	0.84	377.0424
4	0.7	1	0.7	1.2	0.84	377.0424
5	0.7	1	0.7	1.3	0.91	408.4626
6	0.7	1	0.7	0.51	0.357	160.24302
7	0.7	1	0.7	-0.01	-0.007	-3.14202
Total Discharge Rate:					3.7785	1696.01751

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project	Solutia
Date	3/30/01	Project Number	06626M32
Time	1225		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Snow, 31 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.7	1	1.7	1.21	2.057	923.30502
2	1.7	1	1.7	1.56	2.652	1190.37672
3	1.7	1	1.7	1.85	3.145	1411.6647
4	1.7	1	1.7	1.89	3.213	1442.18718
5	1.7	1	1.7	2.01	3.417	1533.75462
6	1.7	1	1.7	2.22	3.774	1693.99764
7	1.7	1	1.7	2.15	3.655	1640.5833
Total Discharge Rate:					21.913	9835.86918

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project	Solutia
Date	4/5/01	Project Number	06626M32
Time	1125		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny, 60F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	1.6	1	1.6	0.77	1.232	552.99552
1	1.5	1	1.5	1.32	1.98	888.7428
2	1.8	1	1.8	1.17	2.106	945.29916
3	1.7	1	1.7	1.26	2.142	961.45812
4	1.6	1	1.6	1.29	2.064	926.44704
5	1.8	1	1.8	1.13	2.034	912.98124
6	1.5	1	1.5	0.84	1.26	565.5636
7	1.5	1	1.5	0.46	0.69	309.7134
Total Discharge Rate:					13.508	6063.2009

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-1	Project Solutia
Date	5/22/01	Project Number 06626M32
Time	1350	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Light rain, 60 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.1	1	1.1	0.18	0.198	88.87428
2	1.1	1	1.1	0.27	0.297	133.31142
3	1.3	1	1.3	0.42	0.546	245.07756
4	1.4	1	1.4	0.47	0.658	295.34988
5	1.5	1	1.5	0.4	0.6	269.316
6	1.3	1	1.3	0.45	0.585	262.5831
7	1.2	1	1.2	0.2	0.24	107.7264
8	0.9	1	0.9	0.13	0.117	52.51662
Total Discharge Rate:					3.241	1454.7553

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-2	Project	Solutia
Date	9/15/00	Project Number	06626M32
Time	1200		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Rainy, 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.65	2	1.3	0.563	0.7319	328.520634
2	0.65	2	1.3	0.603	0.7839	351.861354
3	0.65	2	1.3	0.423	0.5499	246.828114
Total Discharge Rate:					2.0657	927.210102

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-2	Project	Solutia
Date	10/19/00	Project Number	06626M32
Time	1140		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.4	1	0.4	-0.04	-0.016	-7.18176
1	0.4	1	0.4	0.01	0.004	1.79544
2	0.4	1	0.4	0.05	0.02	8.9772
3	0.4	1	0.4	0.04	0.016	7.18176
4	0.4	1	0.4	0.05	0.02	8.9772
5	0.45	1	0.45	0.04	0.018	8.07948
6	0.45	1	0.45	0.01	0.0045	2.01987
7	0.45	1	0.45	0.02	0.009	4.03974
Total Discharge Rate:					0.0755	33.88893

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-2	Project	Solutia
Date	3/22/01	Project Number	06626M32
Time	1245		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Rainy, 50 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.62	1	1.62	0.63	1.0206	458.106516
2	1.62	1	1.62	2.97	4.8114	2159.645004
3	1.62	1	1.62	3.3	5.346	2399.60556
4	1.62	1	1.62	3.71	6.0102	2697.738372
5	1.62	1	1.62	3.6	5.832	2617.75152
6	1.62	1	1.62	3.9	6.318	2835.89748
7	1.62	1	1.62	3.45	5.589	2508.67854
8	1.62	1	1.62	1.81	2.9322	1316.147292
Total Discharge Rate:					37.8594	16993.57028

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-2	Project	Solutia
Date	3/30/01	Project Number	06626M32
Time	1300		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Snow, 31 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.6	1	0.6	0	0	0
2	0.6	1	0.6	0.08	0.048	21.54528
3	0.6	1	0.6	0.65	0.39	175.0554
4	0.6	1	0.6	0.8	0.48	215.4528
5	0.6	1	0.6	0.93	0.558	250.46388
6	0.6	1	0.6	0.05	0.03	13.4658
7	0.6	1	0.6	0.31	0.186	83.48796
Total Discharge Rate:					1.692	759.47112

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location <u>SW-3</u>		Project <u>Solutia</u>	
Date <u>9/15/00</u>		Project Number <u>06626M32</u>	
Time <u>1110</u>			
Gauging Methodology <u>Marsh-McBirney FloMate</u>			
Field Conditions <u>Overcast, light rain</u>			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	2.1	5	11.45	0.387	4.43115	1988.965989
Total Discharge Rate:					4.43115	1988.965989

Notes:

Depth = Depth of water at the segment midpoint
 Length = Width of segment
 Area = Area of segment (Depth x Length)
 1 ft³ = 7.481 gallons
 ft = feet
 sec = second
 gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location <u>SW-3</u>		Project <u>Solutia</u>	
Date <u>11/10/00</u>		Project Number <u>06626M32</u>	
Time <u>1100</u>			
Gauging Methodology <u>Marsh-McBirney FloMate</u>			
Field Conditions <u>Light rain, 50-55 F</u>			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1	5	5.3	1.22	6.466	2902.32876
Total Discharge Rate:					6.466	2902.32876

Notes:

Depth = Depth of water at the segment midpoint
 Length = Width of segment
 Area = Area of segment (Depth x Length)
 1 ft³ = 7.481 gallons
 ft = feet
 sec = second
 gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-4	Project	Solutia
Date	8/30/00	Project Number	06626M32
Time	1708		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 85 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.3	1	0.3	-0.01	-0.003	-1.34658
2	0.4	1	0.4	0	0	0
3	0.5	1	0.5	0.03	0.015	6.7329
4	0.65	1	0.65	0.04	0.026	11.67036
5	0.7	1	0.7	0.03	0.021	9.42606
6	0.7	1	0.7	0.05	0.035	15.7101
7	0.7	1	0.7	0.05	0.035	15.7101
8	0.6	1	0.6	0.05	0.03	13.4658
9	0.6	1	0.6	0	0	0
10	0.45	1	0.45	-0.01	-0.0045	-2.01987
11	0.2	1	0.2	-0.01	-0.002	-0.89772
Total Discharge Rate:					0.1525	68.45115

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-4	Project	Solutia
Date	9/19/00	Project Number	06626M32
Time	1515		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 70 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.4	1	0.4	-0.04	-0.016	-7.18176
2	0.4	1	0.4	-0.01	-0.004	-1.79544
3	0.5	1	0.5	0.03	0.015	6.7329
4	0.6	1	0.6	0.09	0.054	24.23844
5	0.75	1	0.75	0.18	0.135	60.5961
6	0.8	1	0.8	0.25	0.2	89.772
7	0.8	1	0.8	0.15	0.12	53.8632
8	0.75	1	0.75	0.21	0.1575	70.69545
9	0.65	1	0.65	0.1	0.065	29.1759
10	0.6	1	0.6	-0.03	-0.018	-8.07948
11	0.45	1	0.45	-0.04	-0.018	-8.07948
Total Discharge Rate:					0.6905	309.93783

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-4	Project Solutia				
Date	10/4/00	Project Number 06626M32				
Time	1255					
Gauging Methodology	Marsh-McBirney FloMate					
Field Conditions	Sunny; Dry 70 F					
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.4	1	0.4	-0.03	-0.012	-5.38632
1	0.3	1	0.3	-0.05	-0.015	-6.7329
2	0.3	1	0.3	-0.02	-0.006	-2.69316
3	0.35	1	0.35	-0.01	-0.0035	-1.57101
4	0.4	1	0.4	0.08	0.032	14.36352
5	0.5	1	0.5	0.03	0.015	6.7329
6	0.55	1	0.55	0.15	0.0825	37.03095
7	0.65	1	0.65	0.16	0.104	46.68144
8	0.65	1	0.65	0.12	0.078	35.01108
9	0.7	1	0.7	0.12	0.084	37.70424
10	0.7	1	0.7	0.11	0.077	34.56222
11	0.75	1	0.75	0.18	0.135	60.5961
12	0.75	1	0.75	0.08	0.06	26.9316
13	0.8	1	0.8	0.12	0.096	43.09056
14	0.7	1	0.7	0.13	0.091	40.84626
15	0.7	1	0.7	0.1	0.07	31.4202
16	0.6	1	0.6	0.04	0.024	10.77264
17	0.6	1	0.6	-0.04	-0.024	-10.77264
18	0.5	1	0.5	-0.01	-0.005	-2.2443
19	0.5	1	0.5	-0.05	-0.025	-11.2215
20	0.35	1	0.35	-0.08	-0.028	-12.56808
21	0.2	1	0.2	-0.06	-0.012	-5.38632
Total Discharge Rate:					0.83	372.5538

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-4	Project	Solutia			
Date	10/19/00	Project Number	06626M32			
Time	1405					
Gauging Methodology	Marsh-McBirney FloMate					
Field Conditions	Sunny; Dry 60 F					
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	1.4	1	1.4	-0.04	-0.056	-25.13616
2	1.3	1	1.3	0.27	0.351	157.54986
4	1.4	1	1.4	0.4	0.56	251.3616
6	1.6	1	1.6	0.3	0.48	215.4528
8	1.7	1	1.7	0.49	0.833	373.90038
10	1.7	1	1.7	0.34	0.578	259.44108
12	1.75	1	1.75	0.31	0.5425	243.50655
14	1.6	1	1.6	0.35	0.56	251.3616
16	1.6	1	1.6	0.33	0.528	236.99808
18	1.5	1	1.5	0.31	0.465	208.7199
20	1.35	1	1.35	0.12	0.162	72.71532
25	1.1	1	1.1	0.04	0.044	19.74984
27	1	1	1	0	0	0
29	1	1	1	-0.04	-0.04	-17.9544
Total Discharge Rate:					5.0075	2247.66645

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location		SW-4		Project Solutia		
Date		4/3/01		Project Number 06626M32		
Time		1450				
Gauging Methodology		Marsh-McBirney FloMate				
Field Conditions		unknown				
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.3	1	1.3	-0.05	-0.065	-29.1759
2	1.4	1	1.4	-0.15	-0.21	-94.2606
3	1.6	1	1.6	-0.06	-0.096	-43.09056
4	1.9	1	1.9	0.07	0.133	59.69838
5	2	1	2	0.32	0.64	287.2704
6	2	1	2	0.36	0.72	323.1792
7	2.1	1	2.1	0.33	0.693	311.05998
8	2.1	1	2.1	0.46	0.966	433.59876
9	2.2	1	2.2	0.48	1.056	473.99616
10	2.1	1	2.1	0.34	0.714	320.48604
11	2	1	2	0.48	0.96	430.9056
12	2	1	2	0.44	0.88	394.9968
13	1.8	1	1.8	0.41	0.738	331.25868
14	1.7	1	1.7	0.36	0.612	274.70232
Total Discharge Rate:					7.741	3474.62526

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-4	Project Solutia
Date	4/5/01	Project Number 06626M32
Time	1155	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 60 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.4	1	1.4	-0.04	-0.056	-25.13616
2	1.5	1	1.5	0.05	0.075	33.6645
3	1.6	1	1.6	0.11	0.176	78.99936
4	1.8	1	1.8	0.35	0.63	282.7818
5	1.9	1	1.9	0.36	0.684	307.02024
6	1.9	1	1.9	0.36	0.684	307.02024
7	2.1	1	2.1	0.36	0.756	339.33816
8	2.1	1	2.1	0.3	0.63	282.7818
9	2	1	2	0.4	0.8	359.088
10	2	1	2	0.3	0.6	269.316
11	1.9	1	1.9	0.34	0.646	289.96356
12	1.8	1	1.8	0.27	0.486	218.14596
13	1.7	1	1.7	0.35	0.595	267.0717
14	1.5	1	1.5	0.34	0.51	228.9186
Total Discharge Rate:					7.216	3238.97376

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location <u>SW-4</u>		Project <u>Solutia</u>	
Date <u>5/22/01</u>		Project Number <u>06626M32</u>	
Time <u>1405</u>			
Gauging Methodology <u>Marsh-McBirney FloMate</u>			
Field Conditions <u>Sunny; Dry 60 F</u>			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.8	1	0.8	0	0	0
2	0.8	1	0.8	0.01	0.008	3.59088
3	0.9	1	0.9	0.14	0.126	56.55636
4	1	1	1	0.12	0.12	53.8632
5	1.1	1	1.1	0.15	0.165	74.0619
6	1.1	1	1.1	0.14	0.154	69.12444
7	1.2	1	1.2	0.16	0.192	86.18112
8	1.2	1	1.2	0.14	0.168	75.40848
9	1.1	1	1.1	0.16	0.176	78.99936
10	1	1	1	0.12	0.12	53.8632
11	0.9	1	0.9	0.02	0.018	8.07948
12	0.6	1	0.6	-0.07	-0.042	-18.85212
13	0.3	1	0.3	-0.05	-0.015	-6.7329
14	0.5	1	0.5	-0.03	-0.015	-6.7329
Total Discharge Rate:					1.175	527.4105

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-5	Project	Solutia
Date	9/15/00	Project Number	06626M32
Time	1215		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Overcast, light rain		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.5	2.5	1.108	0.04	0.04432	19.8934752
Total Discharge Rate:					0.04432	19.8934752

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-5	Project	Solutia
Date	11/10/00	Project Number	06626M32
Time	1045		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1	2.5	2.22	2	4.44	1992.9384
Total Discharge Rate:					4.44	1992.9384

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-6	Project	Solutia
Date	11/10/00	Project Number	06626M32
Time	1050		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.4	3.5	1.24	1.28	1.5872	712.430592
Total Discharge Rate:					1.5872	712.430592

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-7	Project	Solutia
Date	9/15/00	Project Number	06626M32
Time	1140		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Rainy, 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.85	1	1.85	0.023	0.04255	19.098993
3	1.85	2	3.7	0.073	0.2701	121.237086
5	1.85	2	3.7	0.057	0.2109	94.664574
7	1.85	2	3.7	0.09	0.333	149.47038
Total Discharge Rate:					0.85655	384.471033

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-7	Project	Solutia
Date	11/10/00	Project Number	06626M32
Time	1130		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	2.3	1	2.3	-0.02	-0.046	-20.64756
1	2.35	1	2.35	0.07	0.1645	73.83747
2	2.35	1	2.35	0.02	0.047	21.09642
3	2.35	1	2.35	0.08	0.188	84.38568
4	2.35	1	2.35	0.04	0.094	42.19284
5	2.3	1	2.3	0.07	0.161	72.26646
6	2.3	1	2.3	0.14	0.322	144.53292
7	2.3	1	2.3	0.9	2.07	929.1402
8	2.3	1	2.3	0	0	0
8.5	2.3	0.5	1.15	0.06	0.069	30.97134
Total Discharge Rate:					3.0695	1377.77577

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-7	Project	Solutia
Date	3/30/01	Project Number	06626M32
Time	1355		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Snow, 31 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	2.7	1	2.7	0.19	0.513	230.26518
2	2.7	1	2.7	0.5	1.35	605.961
3	2.7	1	2.7	0.58	1.566	702.91476
4	2.7	1	2.7	0.7	1.89	848.3454
5	2.7	1	2.7	0.91	2.457	1102.84902
6	2.7	1	2.7	0.91	2.457	1102.84902
7	2.7	1	2.7	0.75	2.025	908.9415
8	2.7	1	2.7	0.15	0.405	181.7883
Total Discharge Rate:					12.663	5683.91418

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-8	Project	Solutia
Date	9/15/00	Project Number	06626M32
Time	1155		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Rainy, 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.4	2	0.8	0.023	0.0184	8.259024
2	0.4	2	0.8	0.08	0.064	28.72704
3	0.4	2	0.8	0.013	0.0104	4.668144
Total Discharge Rate:					0.0928	41.654208

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-8	Project Solutia
Date	11/10/00	Project Number 06626M32
Time	1330	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Heavy rain, 50-55 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.5	1	0.5	-0.06	-0.03	-13.4658
1	0.4	1	0.4	-0.11	-0.044	-19.74984
2	0.4	1	0.4	0.1	0.04	17.9544
3	0.5	1	0.5	0.24	0.12	53.8632
4	0.5	1	0.5	0.19	0.095	42.6417
5	0.5	1	0.5	0.25	0.125	56.1075
6	0.5	1	0.5	-0.01	-0.005	-2.2443
7	0.6	1	0.6	-0.16	-0.096	-43.09056
7.5	0.6	0.5	0.3	-0.09	-0.027	-12.11922
Total Discharge Rate:					0.178	79.89708

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location <u>SW-9</u>		Project <u>Solutia</u>	
Date <u>8/30/00</u>		Project Number <u>06626M32</u>	
Time <u>1750</u>			
Gauging Methodology <u>Marsh-McBirney FloMate</u>			
Field Conditions <u>Sunny; Dry 85 F</u>			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.4	1	0.736	1.083	0.797088	357.7809197
Total Discharge Rate:					0.797088	357.7809197

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-9	Project	Solutia
Date	9/19/00	Project Number	06626M32
Time	1545		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 70 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.5	5	1.021	1.63	1.66423	747.00628
Total Discharge Rate:					1.66423	747.00628

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-9	Project	Solutia
Date	10/4/00	Project Number	06626M32
Time	1330		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 70 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.45	5	0.878	1.87	1.64186	736.9652796
Total Discharge Rate:					1.64186	736.9652796

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location <u>SW-9</u>		Project <u>Solutia</u>	
Date <u>4/3/01</u>		Project Number <u>06626M32</u>	
Time <u>1435</u>			
Gauging Methodology <u>Marsh-McBirney FloMate</u>			
Field Conditions <u>unknown</u>			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.1	1	1.1	2.5	2.75	1234.365
2	1.1	1	1.1	2.49	2.739	1229.42754
3	1.1	1	1.1	2.51	2.761	1239.30246
Total Discharge Rate:					8.25	3703.095

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-9	Project	Soluita
Date	4/5/01	Project Number	06626M32
Time	1235		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.5	5	12.28	2.63	32.2964	14496.562
Total Discharge Rate:					32.2964	14496.562

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes:

Stream Gauge Location	SW-9	Project	Solutia
Date	5/22/01	Project Number	06626M32
Time	1425		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 65 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft ²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.7	5	1.6704	1.01	1.687104	757.2735014
Total Discharge Rate:					1.687104	757.2735014

Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons

ft = feet

sec = second

gpm = gallons per minute

Additional Field Notes: